## 4.3 Current Latrine Design (Improved Traditional Vault Latrine)

The current design was prepared in 1996 in the Water and Sanitation Section of DACAAR. The total cost for material is Rs 2,244 ($ 45) out of this DACAAR's contribution is Rs. 584 ($12) and the community's contribution is Rs 1,660 ($33). The retention time for this latrine is approximately 8 months and both urine and faeces go to the same vault.

The strengths of the current design and strategy are as follows:

*Design (See Annex 3-1)*

- Large capacity; DACAAR is installing approximately 6,000 latrines per year in Afghanistan. To date DACAAR has installed approximately 12736 latrines
- Higher community contribution; 67% of the cost of materials is given by the community
- Simple design which is easy to build,
- Low cost,
- Low requirement for user education.

The weakness of the DACAAR Strategy is:

- The strategy relies mainly on replication which in itself is not a weakness if the mechanism exists to encourage replication. However, DACAAR Impact Monitoring Unit performed a study in 1999 in the Jalalabad region and found that only 12% of the community actually built their own latrine as a result of seeing the DACAAR model.

Basically the main increment of the DACAAR latrine over the traditional Afghan latrine is the manhole cover sealing the vault. Since DACAAR is only just now starting a user education programme it is not known whether the community understands the importance of this manhole cover and therefore it is not known whether, when replicating the latrines, the communities seal the vault or not.

## 4.4 New Latrine Design (Double Vault Latrine)

The new DACAAR design is inspired by the Vietnamese latrine design. In 1965, the Ministry of Health in Vietnam started introducing this latrine throughout the country. There were also long and persistent education campaigns to teach the people how to use the latrine properly. Although, there was a major conflict in Vietnam shortly thereafter, by 1976 Vietnam was recycling about 600,000 tons of human waste a year. Success in producing significant amounts of manure was therefore achieved within 15 years. *(See Annex3-2)*

If we consider the situation in Afghanistan it is hard to visualise the same kind of time scale since in Vietnam the government promoted the new latrines. In Afghanistan in the absence of such a consolidated approach, it may take longer to achieve the same level of success. However at least, we, as agencies working in sanitation, can agree on a common approach to sanitation. If we do this, and hopefully this workshop is a step towards this goal, then we may achieve significant fertiliser production in

Afghanistan within 20 years or so, depending of course on how the situation in Afghanistan develops.

The double vault latrine as revised for use in Afghanistan involves the following design features:

#### 4.4.1 Squatting Plate

Since the issue of urine splashing is a major concern for Afghans; the urine diversion channel has a slope of 2% away from the squatting plate and towards the exit pipe. The liquids are conducted outside the latrine into a soak pit. *(See Annex 3-3-5)*

#### 4.4.2 Vault

Retention time for faeces in the vault is approximately three months per vault so a total of six months for 8 users. The vault has a volume of about $1m^3$ but the addition of soil to the excreta in order to absorb humidity and fix nitrogen increases bulk and reduces retention time.

The design for the vault is still under process; the problem is trying to find a low cost way of lining the vault. Concrete rings and stone masonry are both costly. One option is not to line the vault at all.

#### 4.4.3 Soak Pit

The design of the soakpit is also still under process; basically the priority is to maximise the recycling of return which mean accessing the nitrogen in urine. The nitrogen contained in urine tends to evaporate so that if urine is stored with faeces there is substantial loss of nitrogen through evaporation, leaking and the like. DACAAR is therefore designing a soak pit that will prevent evaporation of the urine; in this way significant amounts of nitrogen contained in the urine will be fixed in the soil and can then be used as fertiliser. *(See Annex 3-3-6)*

#### 4.4.4 Advantages and Disadvantages

Preliminary experience with the new latrine design indicate that, in general, there is a positive reaction from the community. The communities understand that this design will create more fertiliser; they also consider that there will be less smell if urine is diverted. It seems from questioning people that many communities do not install latrines because they do not like the smell of latrines.

Unfortunately we are also finding that the users do not understand the importance of keeping the urine channel free of dirt. What happens is that the soil used for the vault often gets spilt in the urine diversion channel where it soaks up urine and starts to smell. So, to have an odourless latrine the users have to keep the urine channel clear of soil.

Another problem is the use of too little soil in the vault. Traditionally Afghans sprinkle ash on faeces to absorb moisture and not soil. From the dehydration perspective ashes and soil have equal value however, from the agricultural prospective it is better to use soil, because soil fixes nitrogen and ashes do not. Users of the new latrines are sprinkling soil on the faeces but not enough. This latrine requires an equal volume of soil to faeces, so it is a question of 2 to 3 good handfuls of soil down the vault after each use.

### 4.4.5 Ghazni Tower Latrine

In Ghazni there is an interesting traditional latrine design which could be called the Ghazni Tower Latrine. Essentially it is a two-storey latrine where the bottom storey is the faeces vault and the top is the slab and the super structure of the latrine. The benefits of this indigenous design are:

- It is single vault latrine requiring only one slab and thus reducing cost
- The two storeys mean increased retention time (probably annual emptying) is possible which leads to greater dehydration and safer faeces.
- The latrine includes urine diversion although the urine is not recycled

## 4.5 Discussion from the floor

In response to a question from the floor, DACAAR replied that replication of the current DACAAR latrine is not widespread for two reasons: (i) latrines tend to be luxury items in Afghanistan, too costly for poor households to install without any assistance, and (ii) to promote replication requires more social organisation around this issue than exists at present in DACAAR strategy.

In response to a question on the possibility of success in promoting urine diversion and use of urine in agriculture, Martin replied that, technically, DACAAR and the WSG are not that far from achieving a successful and appropriate latrine design; the challenge will be however to educate the population to use the latrine properly. Urine diversion is not generally well known in Afghanistan although is it normal practise in some areas such as in the West. In addition there is a certain aversion to handling urine and faeces. So barriers need to be broken down before we can be sure that this policy will succeed.

DACAAR is conducting demonstration trials using the urine fertiliser/compost to show the community the benefits of using the urine soaked soil as fertiliser.

In answer to a question concerning transmission of helminths through urine, DACAAR replied that helminth eggs are excreted in faeces not in urine and therefore using urine compost or recycling urine does not pose a helminth threat. It was also reiterated that the urine would not be open to the environment but closed to prevent nitrogen evaporation.

It was suggested from the floor that the expensive and heavy slab could be more cheaply and easily produced using brickwork.

## 4.6 Useful References for Sanitation Projects

*Ecological Sanitation, Esrey et al, Sida, 1998*
This book is based on Sida experience and research into ecological sanitation. It includes experience from all over the world and is a very good book.

*Human Faeces, Urine and their utilisation*
This publication gives a detailed explanation of the Vietnamese experiences for those of you who are interested in community mobilisation this is an interesting publication because in Vietnam they actually organised agricultural co-operatives to recycle the

urine, etc.

*Sanitation without Water*
This is more of a general reference on sanitation.

# 5. Presentation of SCA Latrine Designs

By Eng. A. Aini, Chief Adviser Rural Engineering

In 1993 SCA constructed 100 single dry pit latrines as model latrines attached to schools and clinics. Then in 1999 the SCA Health Program decided to construct a limited number of latrines attached to clinics and schools. Before implementing the 1999 project the implementation strategy were reviewed and some changes were made. It was decided for example to construct one latrine with two compartments instead of two single pit latrines to SCA supported clinics and to construct a 4-compartment latrine instead of 4 individual latrines attached to SCA schools.

## 5.1 Single Dry Vault Latrine

### 5.1.1 Important Features of the dry vault latrine design:

*Design (See Annex 4-1)*

- Socially acceptable
- Environmentally sound
- Comparably low cost

### 5.1.2 Cost

The cost of latrine build by SCA is slightly high because the latrines were constructed in the schools and clinics so community contribution was not available. The construction cost for building such a latrine is Rs.9648 ($192), that include all cost e.g. labour, material, tools and equipment.

### 5.1.3 Advantage of the design

- Urine and faeces are separated
- Can be constructed in area where water table is high
- Less smell
- Prevents spreading of pollution
- Can be constructed in areas where water is limited

### 5.1.4 Disadvantages of the design according to the designer

- Designed for one family (up to 7 members)
- In cold weather does not react well because there are freezing chances of faeces
- Smaller size of vault means less retention time

### 5.1.5 Discussion from the floor

In an answer to a question from the floor SCA responded that the idea behind building model latrines in school and clinics is to educate the community in sanitation with a view to replication. This is being done in co-ordination with the health and education units of SCA by sending the health trainers into schools and clinics and spending two to three hours daily with the community.

## 5.2 Double compartment dry vault latrine

SCA has constructed a limited number of this type latrine since 1999 attached to clinics. *See (Annex4-2-1)*

## 5.3 Four compartments dry vault latrine attached to schools

*See (Annex 4-3-1).*

# 6. Recommendations of Working Group on Latrine Design

## 6.1 Selection of latrine design for Afghanistan

Double vault latrine is recommended as the model latrine for Afghanistan with the following criteria:

- The optimum vault size of the latrine considering the temperature difference in different parts of Afghanistan is (width 0.8, length 1.0 and height 1.20 meter). This size will provide an average of one year retention time.
- The issue of cementing the vault floor depends on the water table, if the water table is high it is recommended to concrete the floor, otherwise, it should not be concreted because there are some benefits in that some moisture and some gases are disposed of through the earth strata.
- Cement mortar should be used for sealing vault walls.
- One of the two openings for defecation in the squatting plate should be sealed and the other should be provided a lid, in order to, avoid using both vaults in the same time.
- Ventilation 4 inch PVC pipe should be provided from vault to roof top or opening of 4 x 4 inches in the wall, and wire mesh is a must on the top opening.
- Before implementing a latrine project agencies should review the existing practices of excreta disposal in the village, and the peoples economy and affordability and also social acceptance.

## 6.2 Advantages

- Complete decomposition of organic matter will take place
- Waste recycling is possible

## 6.3 Disadvantages

- The cost of latrine will be higher and also it requires a larger space
- Requires higher community contribution

# 7. Recommendations of Working Grope on Waste Separation

It is recommended that urine diversion be adopted by agencies working in sanitation. Further recommendations in this respect are as follows:

- It is recommend that agencies research more designs suitable to different local condition
- Soil used in the vault should be collected locally
- Use of soil is better than ash because it is easily available and fixes nitrogen better than ash
- It is also acceptable to mix ash with the soil since ash kills some pathogens
- The effective use of urine and faeces should be discussed and studied together with communities and users

- It would be interesting to develop a proper strategy for storing faeces to increase its safety and fertilising quality
- To avoid splashing the urine channel should be built deeper.
- There should be foot-rests on the squatting plate to guide squatting position of users.

Following data should be collected before implementing urine diversion technology:

- Are the users ready to use soil
- Are the users ready to use soak pit soil on their fields
- How do they like the urine diversion compared with the combined use of faeces and urine
- Are the users ready to compost faeces
- Evaluate willingness to pay for the technology
- Develop an educational package to accompany latrine installation

## 7.1 Floor comments

We should encourage people to use urine as fertiliser and also we should investigate the possibility of creating markets for the sale of the urine as fertiliser.

# 8. Recommendations of Working Group on Community Participation

It is recommended that:

- Agencies should always offer a range of options for latrine improvement to users.
- Agencies should develop latrine designs across a wide price range.
- Agencies should cover whole communities with sanitation technology so as to improve impact.
- Sanitation programs should be integrated into larger development programs.

## 8.1 Community Contribution

- Users should contribute local materials and unskilled labour.
- Agencies should have a strategy for providing facilities to the vulnerable poor and widows free of any contribution.
- Local masons should be trained.

## 8.2 Hygiene Education

- Implementing agencies should not install the latrines until hygiene education is complete.
- Agencies need to develop hygiene education.

## 8.3 Floor comments

- We may have some exceptions in certain cases but in general we should have some similarity between the rich and poor.

- Some agencies are doing hygiene education and some are not, it should be a matter of policy that all do hygiene education.
- We have to look furthermore to integrated development programs, community development and improving livelihoods.
- We should accept water supply, sanitation and health education as a package, otherwise it will not be helpful.
- It was suggested that some written instruction should also be given to communities before installation of the latrine component.
- The aim of the agencies is not to make latrines for all, which is impossible, but to motivate the people to build themselves latrines.
- We need a Convenor for the process of development of appropriate sanitation technologies whether it is ACBAR, DACAAR or UNICEF.

## 9. Conclusion

The workshop was summed up with the following comments by Mr. Aung Chein, UNICEF.

Thank you all on behalf of the Water and Sanitation Group for Afghanistan who, in collaboration with DACAAR and ACBAR conducted this sanitation workshop. I think the workshop has been really fruitful and useful.

In the concluding let me summarise the recommendations which we have come up with.

- We should promote the double vault latrine for use in Afghanistan because most of the people are using faeces as fertiliser.
- We should continue to improve the design of the double vault latrine and keep on promoting the proper use. The design should be flexible to use local materials in construction.
- The use of urine and faeces as fertiliser should be studied in terms of promoting proper use.
- Agencies should offer a variety of options to users in terms of latrine design
- Agencies should and keep on promoting all sanitary latrines selected in the area considering ground situation and economic condition of the communities.
- It is also recommended that poor and vulnerable groups should be given priority by the implementing agencies.
- The local human resources within the villages should also be strengthened by agencies in the form of conducting hygiene awareness campaigns as well as the required sanitary product information.
- For sustainability of sanitation programs, the appropriate technology should be handed to local people through improvement of private sector support.

Finally, I would like to say that the WSG has agreed to form three Working Committees; the first is the Hand pump Technology Working Group, the second is focussing on the drought situation and the third will be the Hygiene Education Working Group. The Hygiene Education Working Group will develop and improve hygiene messages and materials, communication techniques and training for health trainers.

The WSG Working Group will look at the recommendations of this workshop and follow up as required. They will collect all needed information for technology improvement and get feedback from the field.

Dr. Kerry Jane Wilson, Program Manager DACAAR, thanked all the participants and presenters for their hard work and putting together their presentations. She also thanked ACBAR for their assistance in putting together this workshop in particular Nancy Dupree from ACBAR. She also thank Mr. Asadullah Akramyar, Martin Krayer von Krauss for putting together the workshop and Eng. Bismellah Mirzad for chairing the workshop.

# 10. Recommendation summary from the workshop on Development of Appropriate Sanitation Technology for Afghanistan

## 10.1 Latrine design:

- It is recommended that agencies should promote the double vault latrine because most users make use of faeces.
- Double-pit latrine design is also popular. However the cost is a constraint. Agencies will test more designs /models until an appropriate design for Afghanistan is found.
- The exhaust pipe should be of concrete not PVC to maximise the ventilation effect. If it is PVC it should be at least 4 inches in diameter, with masonry it can be increased further.
- It is recommended that the prevention of urine splashing should be taken into consideration in the latrine design. For this purpose the slab thickness and depth of the urine channel should be increased although it will probably affect the cost.
- The slab design and/or the superstructure design should include space to keep bucket or pot for cleaning materials such as water or soil.
- NGOs should offer latrines improvement options to users.
- NGOs should develop latrine designs across a price range.
- A place that the dirt things can accumulate inside the latrine should be considered in the design.

## 10.2 Sanitation program strategies

- NGO sanitation strategies need to cover whole communities in order to be effective.
- Sanitation programs need to be integrated into larger development programs in order to be effective.
- All sanitation projects should include hygiene education.
- It is recommended that use of both urine and faeces as fertiliser needs to be promoted.

# 1. Introduction

**by Engineer Bismellah Mirzad, Section Head, Water & Sanitation Section, DACAAR**

Welcome to this workshop on the development of appropriate sanitation technology for Afghanistan. This workshop has three objectives:

- to share information on the various designs being used by agencies working in Afghanistan,
- to assess the appropriateness of promoting the use of excreta and urine as fertiliser in Afghanistan
- to prepare some guidelines regarding appropriate designs for hygienic latrine in Afghanistan

There is little data at present on access to safe excreta disposal in Afghanistan and how the situation has developed since the fighting started 20 years ago. However, the best estimates we have at the moment indicate that overall only 12% of the population have access to hygienic sanitation (7% in rural and 23% in urban areas)[1].

Unfortunately, even where families do have access to adequate sanitation it is not generally used by the whole family since, in Afghan culture, in some areas, men go outside the compound for defecation and bathing and women use whatever facilities are available inside the compound. As is usual in most cultures with limited sanitation facilities, children tend to defecate wherever they find themselves.

Several agencies now install sanitation facilities in urban Afghanistan and a few in rural Afghanistan. The designs used vary, usually depending on the budgets of the agencies involved and their commitment to community participation.

The Water & Sanitation Sectoral Group for Afghanistan (WSG) has already standardised a range of handpump technology for Afghanistan and produced guidelines as to implementation strategy for water and sanitation projects. These guidelines also include a design for latrines; however the WSG is not satisfied with this one latrine design and would like to develop a range of designs to be used under different circumstances. The WSG would also like to develop a set of guidelines specifically related to sanitation technology.

In this workshop today we have therefore a lot of work to do. During the morning four of the main agencies installing latrines in Afghanistan will present the designs which they use. During the afternoon we will discuss in groups some of the issues critical to safe excreta disposal strategies and facilities and then present the group work. The result of the workshop will be a document, which can either be used to prepare guidelines for sanitation projects, or which will be used in further workshops until we are ready to prepare the guidelines. It is therefore suggested that we think of this workshop as the first step in a process, which may take some time.

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[1] The State of the World's Children, 2000, UNICEF

## 10.3 Community Contribution/Participation

- Users should contribute local materials and unskilled labour. In addition to this, NGOs should ensure that the vulnerable poor and widows can benefit from projects without contribution.
- For sustainability, local masons should be trained in latrine construction.
- Some written instruction should be given to users before latrine installation.

## 10.4 Follow-up Action

The following questions should be answered by the WSG:

- How to continue the process of development of appropriate sanitation technology?
- How to institutionalise recommendations?
- How to make the process practical?
- Who is going to check progress?
- Who is going to feedback the information?
- Who is going to implement these designs?
- Who is going to try different things out?
- A Convenor is required for the process of development appropriate sanitation technologies; ACBAR or DACAAR or UNICEF?
- How should NGOs focus on motivating people to build themselves latrines?

# ANNEXES

Annex 1: WHO Latrine Designs

Annex (1-1) Family Latrine Design for Places with High Groundwater Table
Annex (1-2) Family VIP Latrine Design
Annex (1-3) Family VIP Latrine (Liquid/Solid Separation)

Annex 2: GAA Latrine Designs

Annex (2-1) Traditional Afghan Dry Vault Latrine Design
Annex (2-2-1) Improved Traditional Afghan Vault Latrine Design (front and Elevation)
Annex (2-2-2) Improved Traditional Afghan Vault Latrine Design (Details)
Annex (2-2-3) Improved Traditional Afghan Vault Latrine Design (Trap Door)

Annex 3: DACAAR Latrine Designs

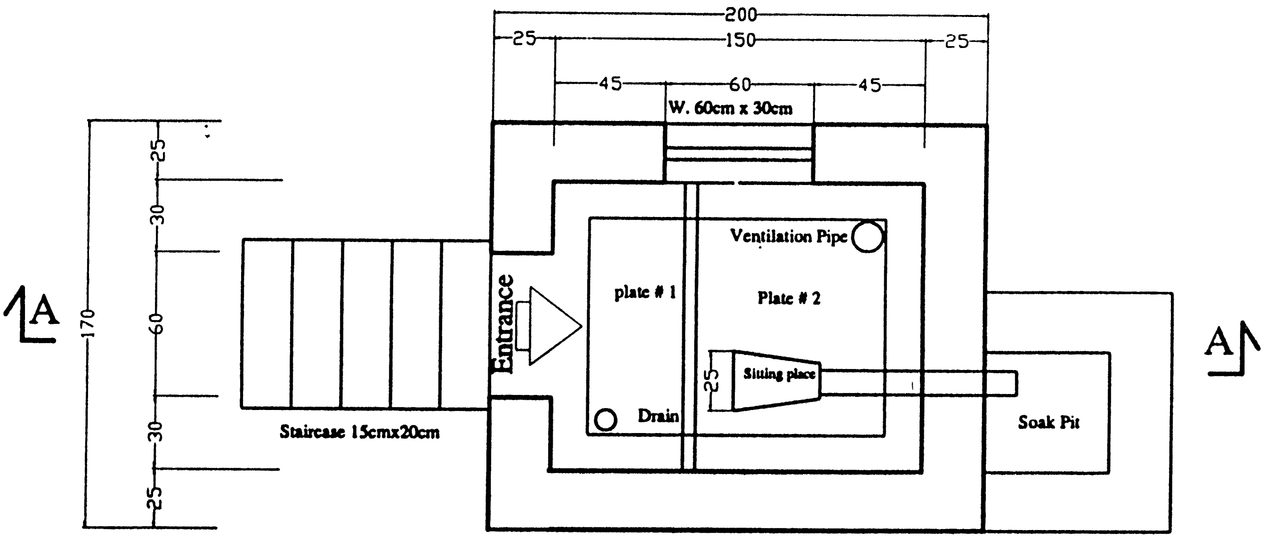
Annex (3-1-1) Improved Traditional Vault Latrine Design (Plan and Elevation)
Annex (3-1-2) Improved Traditional Vault Latrine Design (Slab Reinforcement)
Annex (3-2-1) Single Vault Latrine Design (Foundation Plan)
Annex (3-2-2) Single Vault Latrine Design (Floor Plan)
Annex (3-2-3) Single Vault Latrine Design (Vault and Wall Section)
Annex (3-3-1) Double Vault Latrine Design (Foundation Plan)
Annex (3-3-2) Double Vault Latrine Design (Floor Plan)
Annex (3-3-3) Double Vault Latrine Design (Wall Section)
Annex (3-3-4) Single/Double Vault Latrine Design (Non RCC Floor Details)
Annex (3-3-5) Single/Double Vault Latrine Design (Squatting Slab)
Annex (3-3-6) Single/Double Vault Latrine Design (Urine Soak Pit)
Annex (3-3-7) Single/Double Vault Latrine Design (Squatting Slab Reinforcement)

Annex 4: SCA Latrine Designs

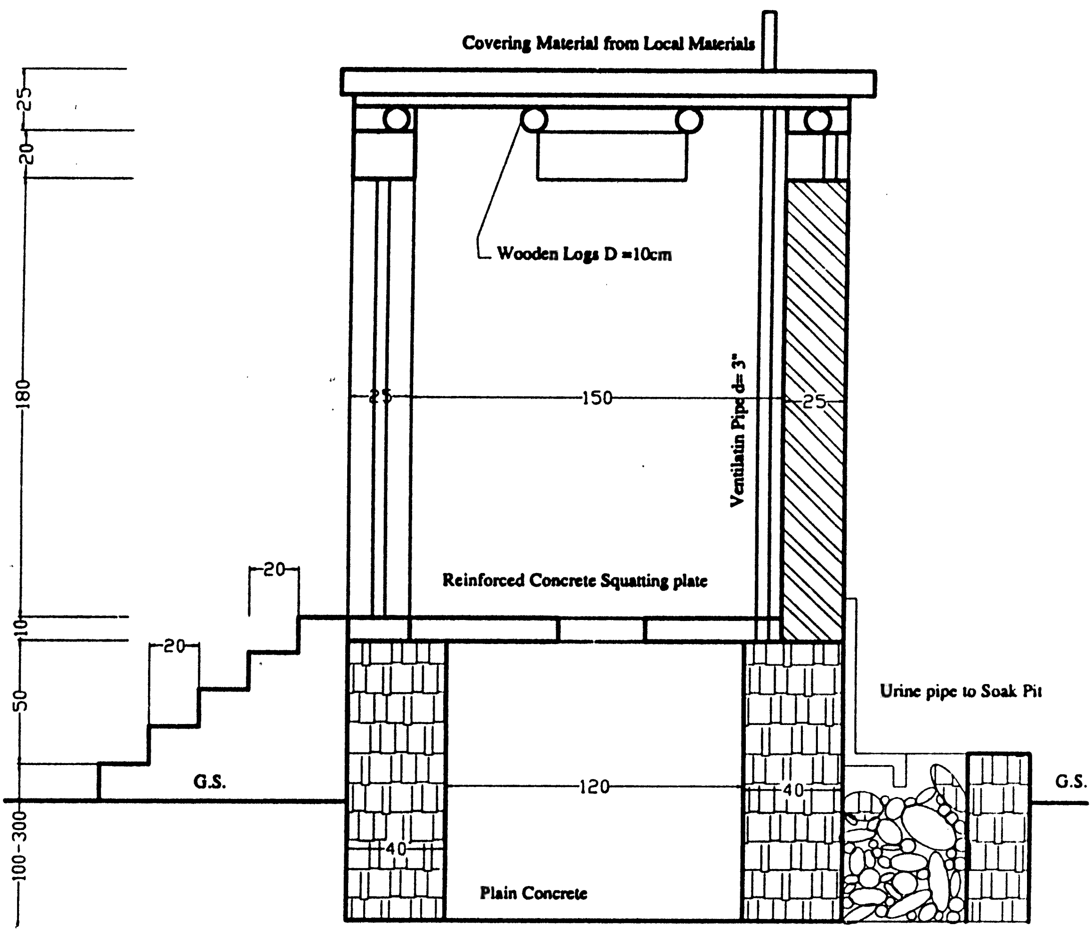
Annex (4-1) Single Pit Dry Vault Latrine Design (Foundation and Floor Plan)
Annex (4-2-1) Double Compartment Dry Vault Latrine Design (Foundation Plan)
Annex (4-2-2) Double Compartment Dry Vault Latrine Design (Floor Plan)
Annex (4-3-1) Four Compartment Dry Vault Latrine Design (Foundation Plan)
Annex (4-3-2) Four Compartment Dry Vault Latrine Design (Floor Plan)

# Annex 1
# WHO Latrine Designs

# WHO Family VIP Latrine Design for Places with High Groundwater Table




*Ground Floor Plan*

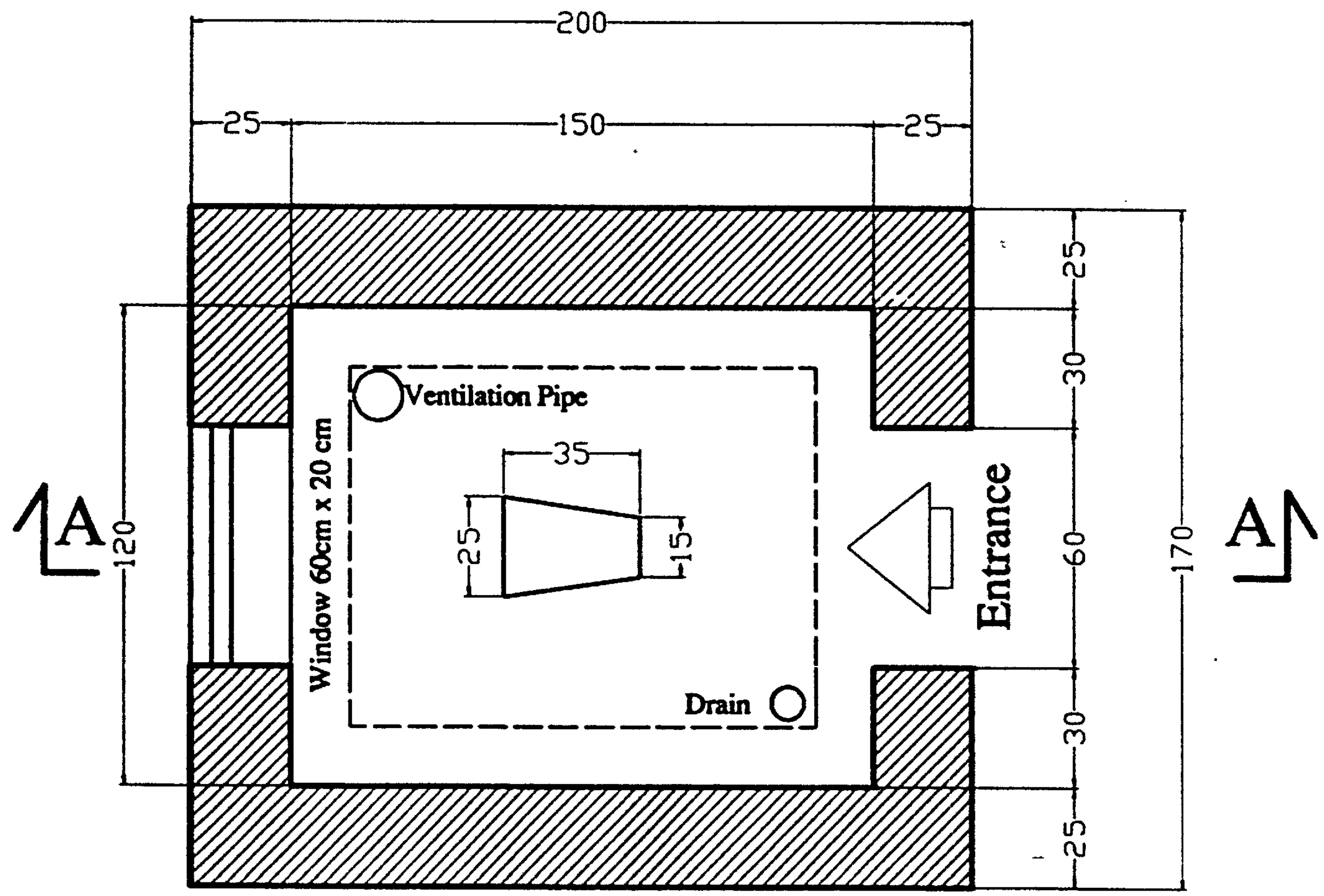



*Section A-A*

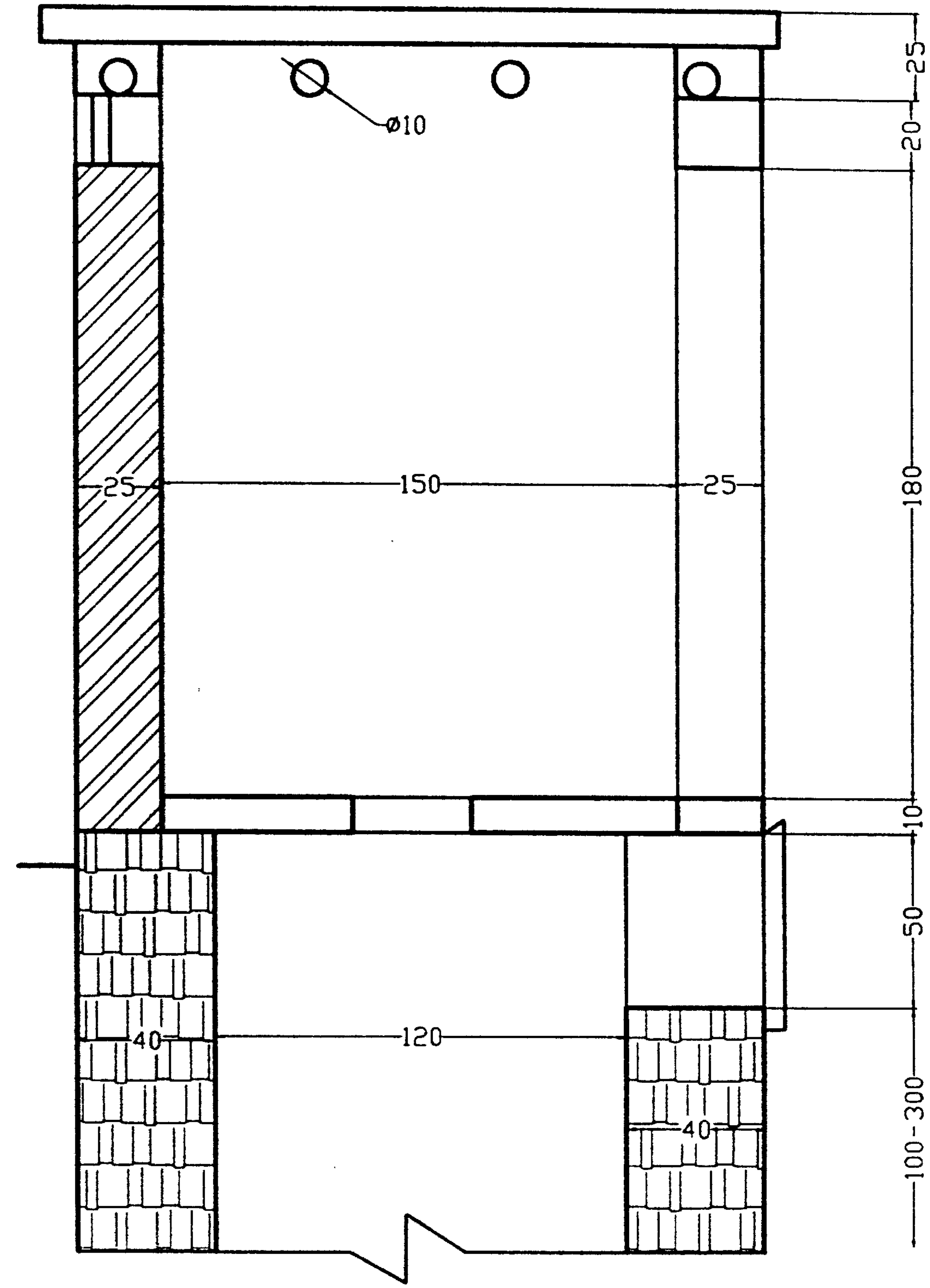


*Annex (1-1)*

WHO Family VIP Latrine Design



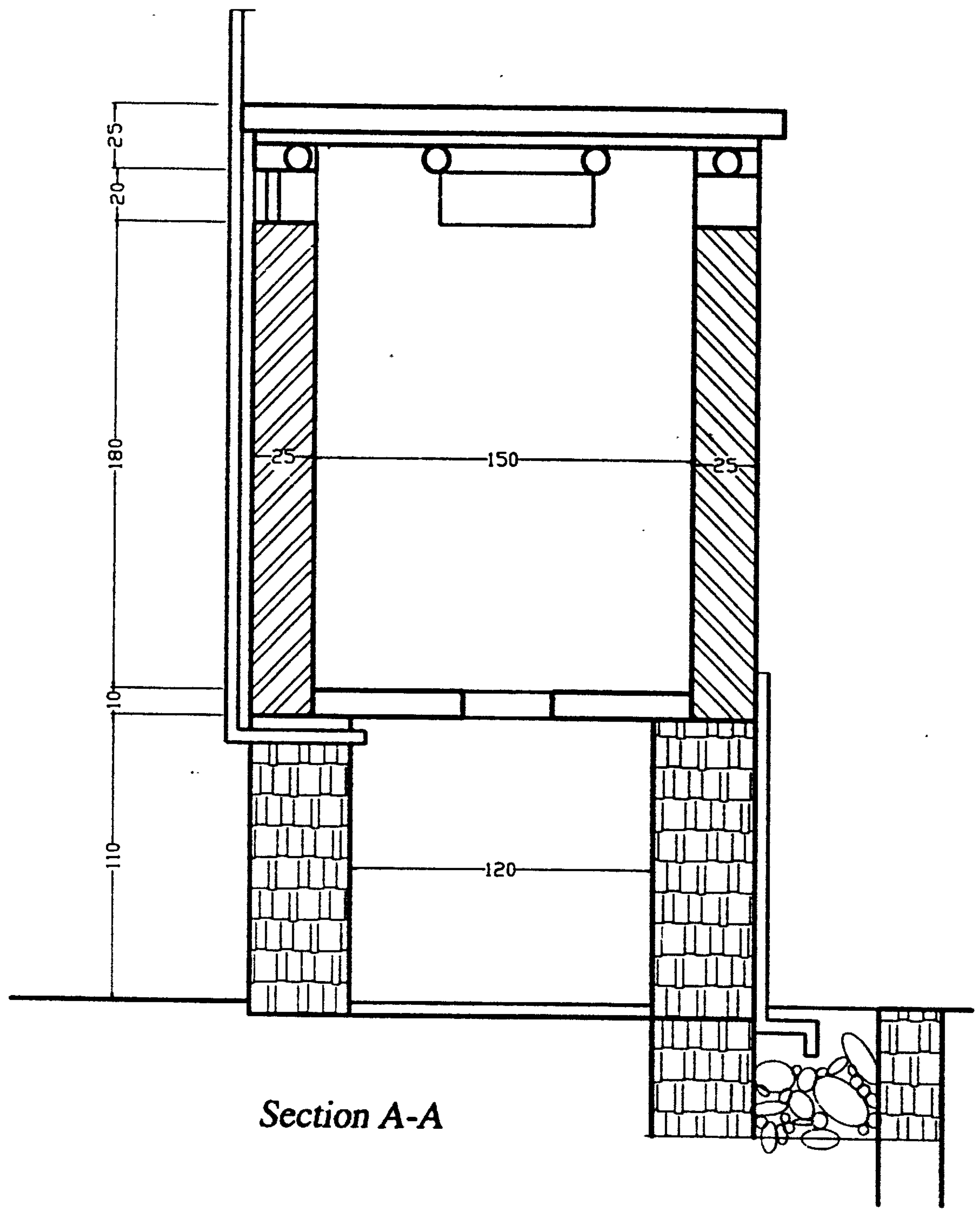

Ground Plan



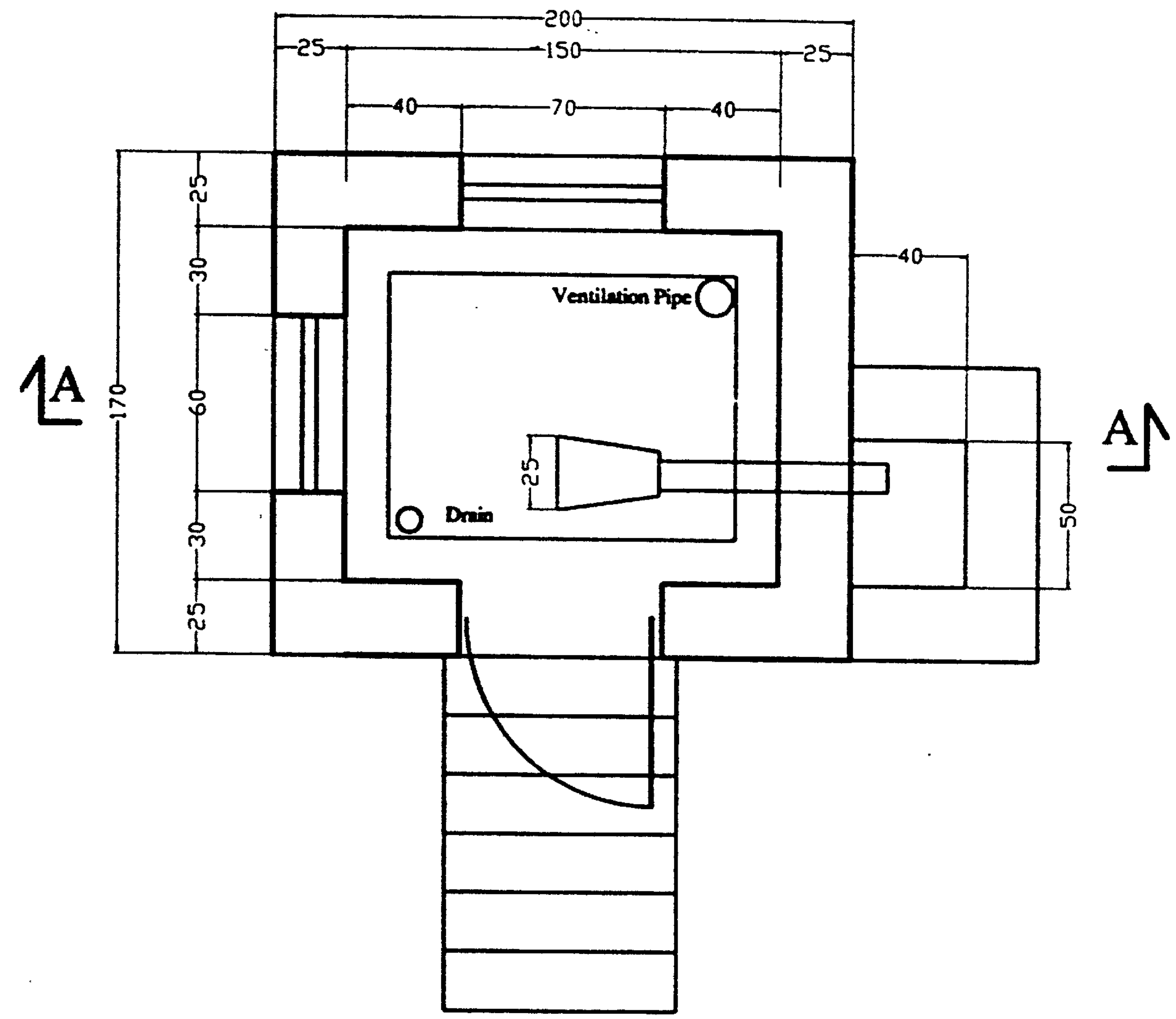

Section A-A

Annex(1-2)

# WHO Family VIP Latrine (Liquid/Solid Separation) Design



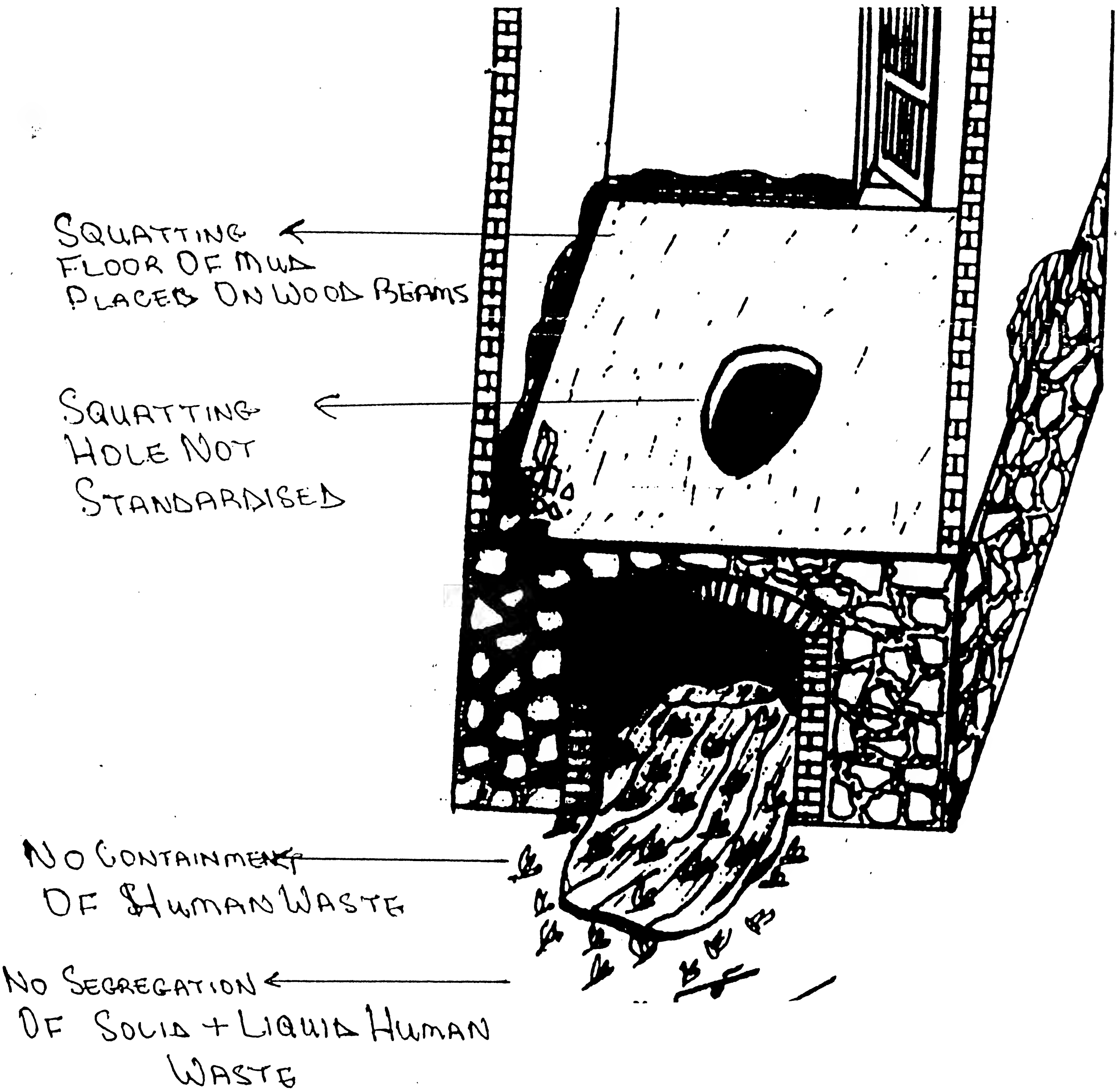

Section A-A



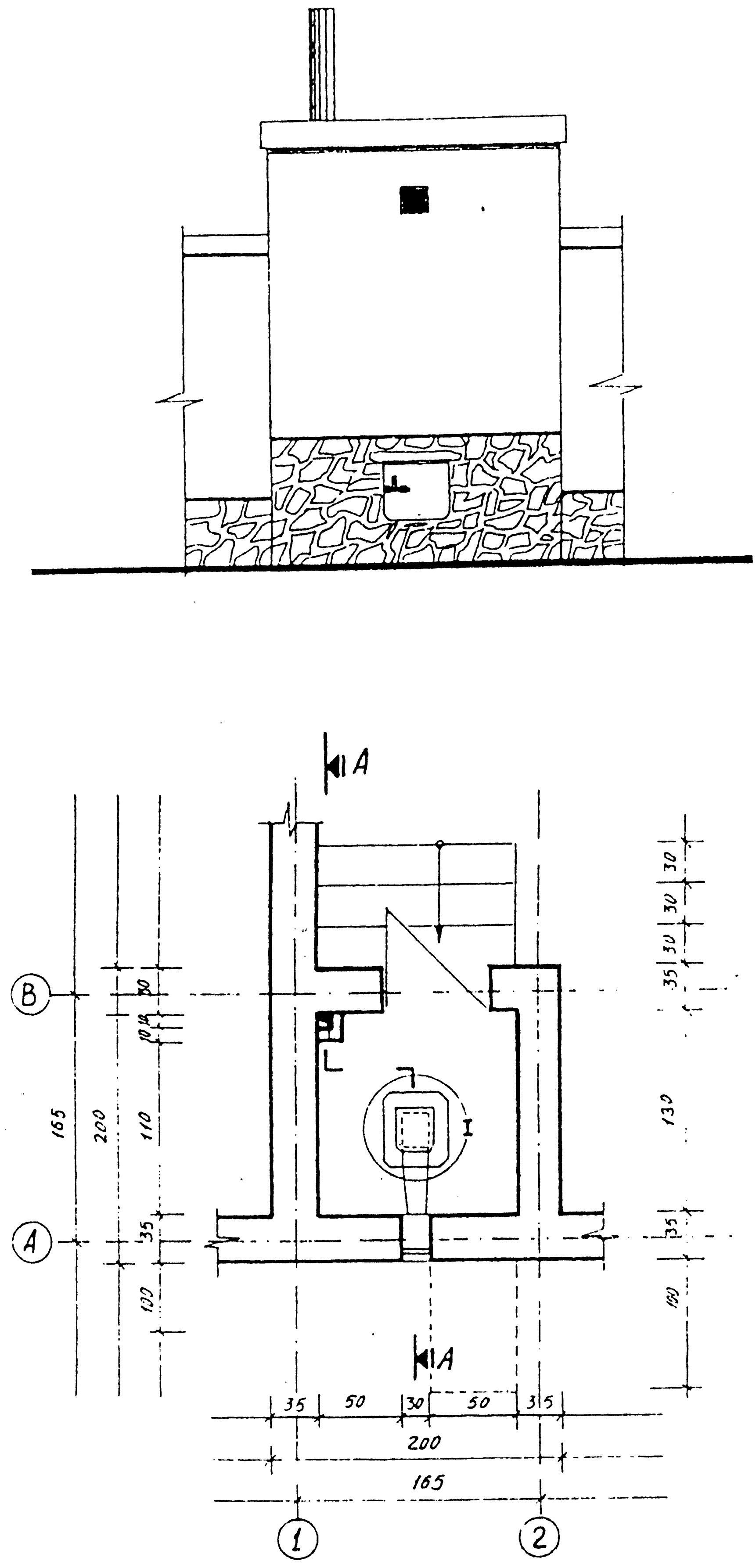

Ground Floor Plan

Annex (1-3)

# Annex 2
# GAA Latrine Designs

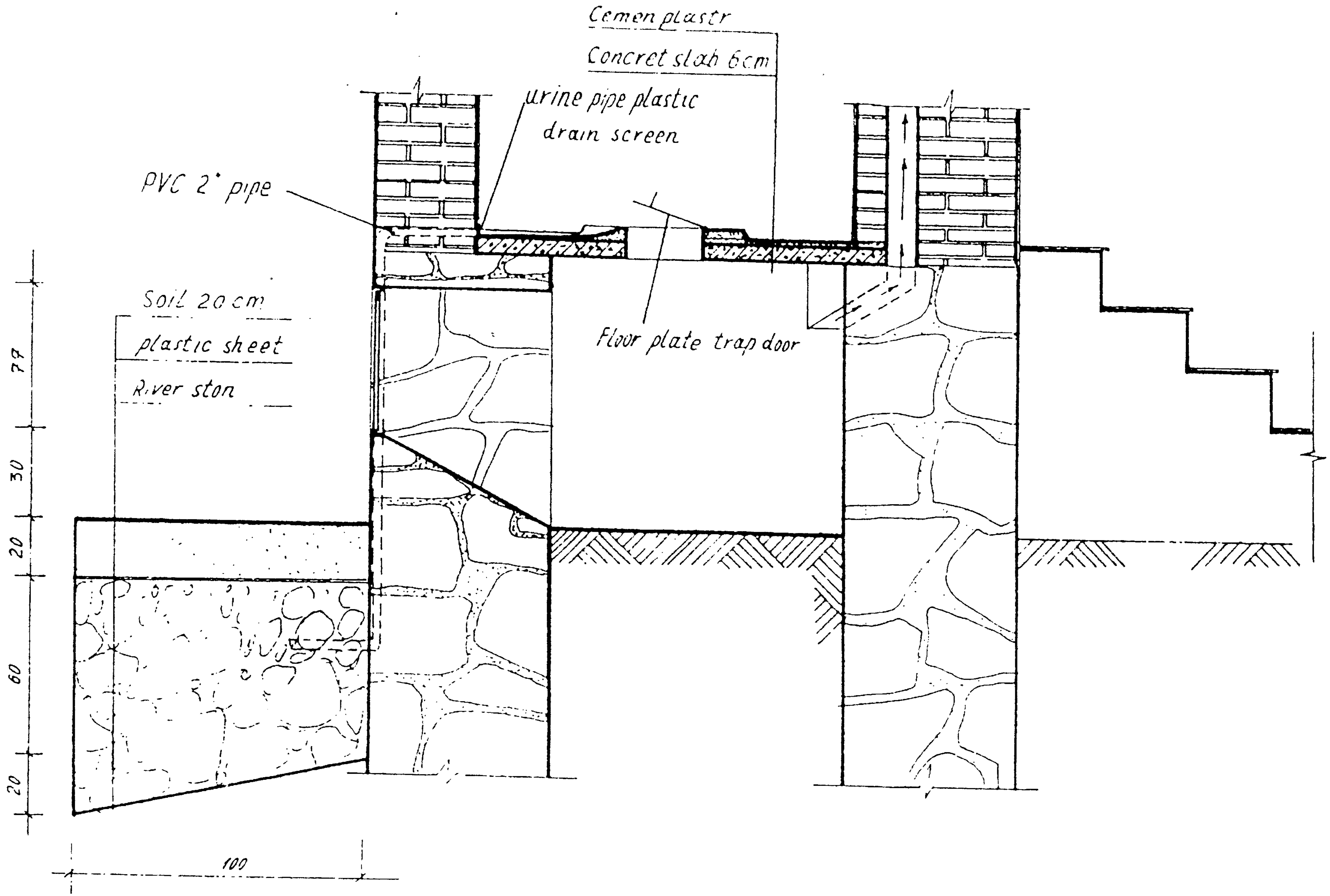



Annex (2-1) Freehand Sketch






Annex (2-2-1) Front Side and Floor Plan




Annex (2-2-2) Design Details

# 2. Presentation of WHO Latrine Designs

**By Dr A K Alim, WHO**

WHO presented four designs:

- Family Latrine Design (for places with high ground water table)
- Family VIP latrine
- Family VIP latrine (Liquid/Solid Separation Type)
- Double, Ventilated, Improved Pit Latrine

## 2.1 Family Latrine Design for Places with High Groundwater Table

*Design (See Annex 1-1)*

- This is a pit latrine with facilities for emptying the pit.
- The design is suited for places with higher groundwater (less than 6 metres).
- The floor of the pit is made out of plain concrete that does not allow wastewater to intrude into groundwater bodies and hence prevents groundwater pollution.
- To reduce the volume of the waste in the pit, the liquid part of the waste is separated into a soak pit.
- The soak pit is considered to function as a biological treatment unit.
- When the latrine vault is filled with waste, plate #1 of the squatting plate can be overturned and the vault cleaned. The squatting plate can then be replaced and the latrine put back into operation.
- The cabin dimensions are: 150 cm by 120 cm making it quite spacious.

*Operating principles*

- Urine is diverted into the urinal channel; this saves space in the latrine vault and thus increases retention time of faeces in the pit.
- The separation of urine from excreta accelerates, to some extent, the dehydration of waste in the vault.
- The waste taken out of the pit should be mixed with earth and stored underground for a period of more than a year before it can be used as fertiliser.

*Cost*

The cost of material for design is $69 However if the size of the latrine is reduced, the cost will be reduced accordingly.

*Retention Time*

The retention time for the vault is three years for one family (10 members).

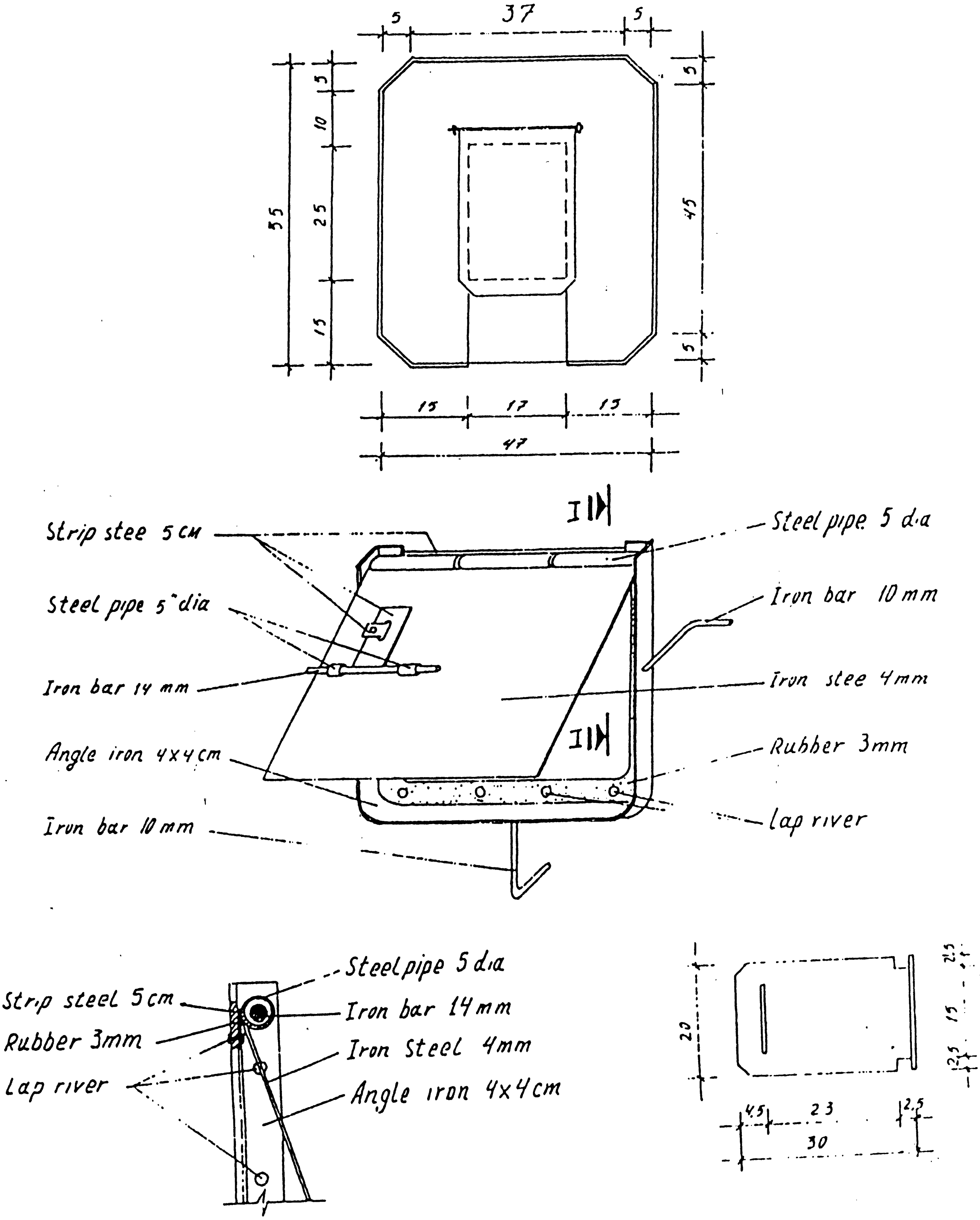
*Advantages and Disadvantages*

Advantages according to the agency:

- The squatting plate is in two pieces, which facilitates the removal of waste when the pit is full.
- Sealed floor of the pit ensures no infiltration into groundwater bodies

The disadvantages according to the agency:

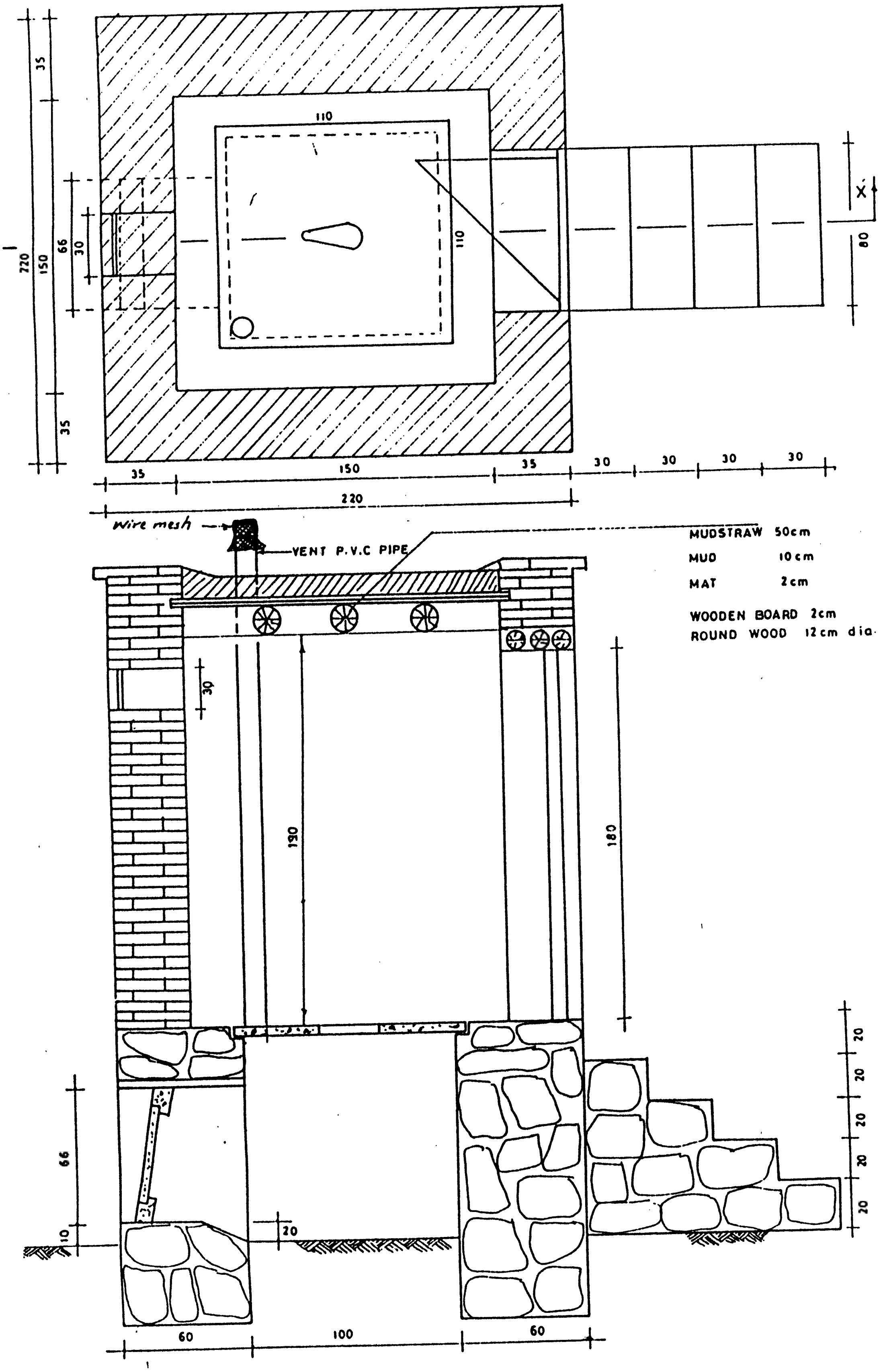
- Since there is only one pit, the waste cannot be composted completely in it.



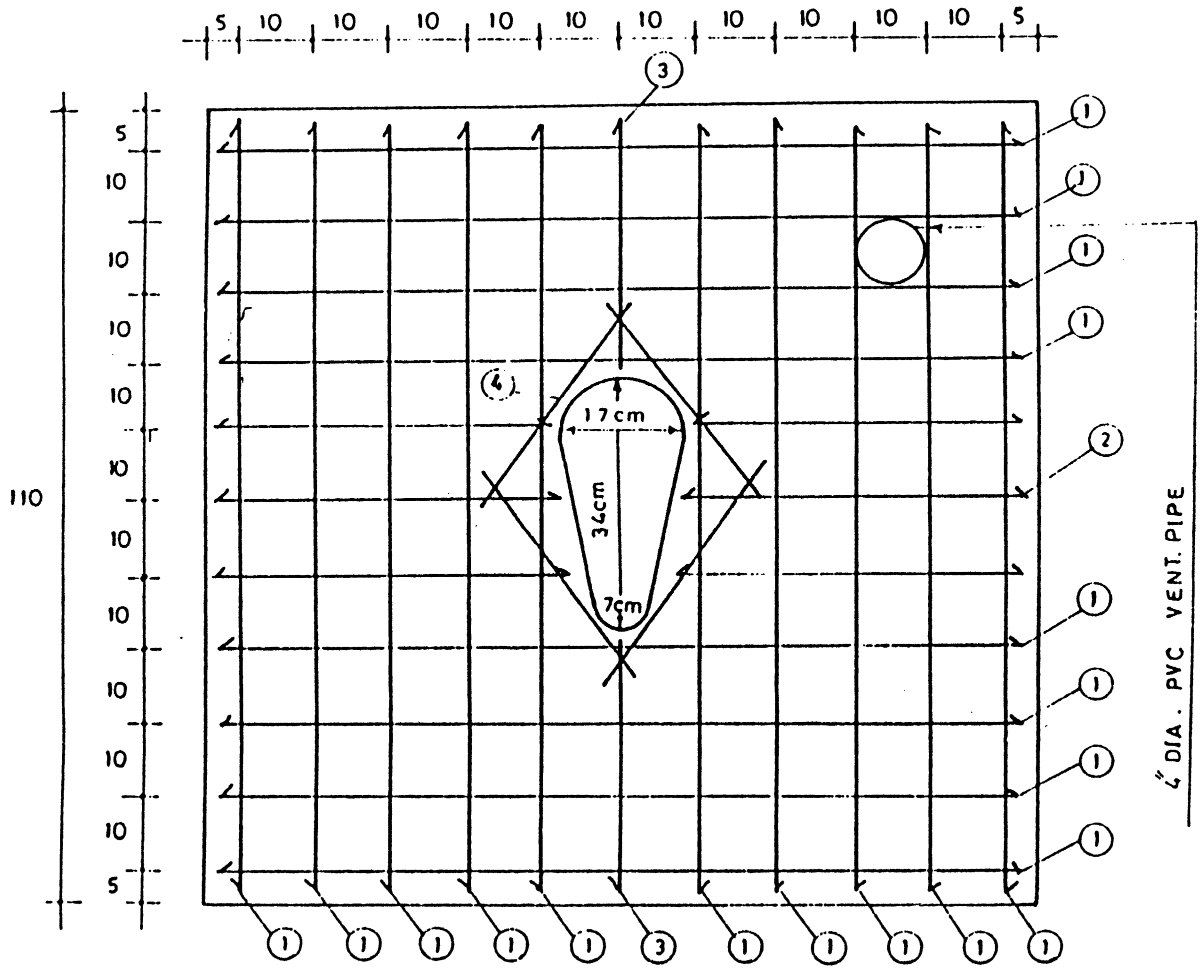

Annex (2-2-3) Floor Plate Trap Door Design

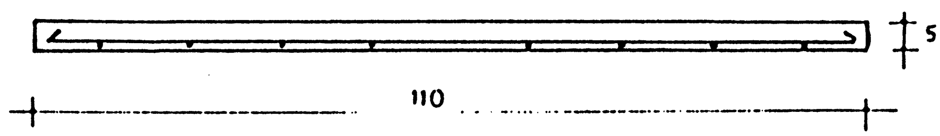
**Annex 3: DACAAR Latrine Designs**

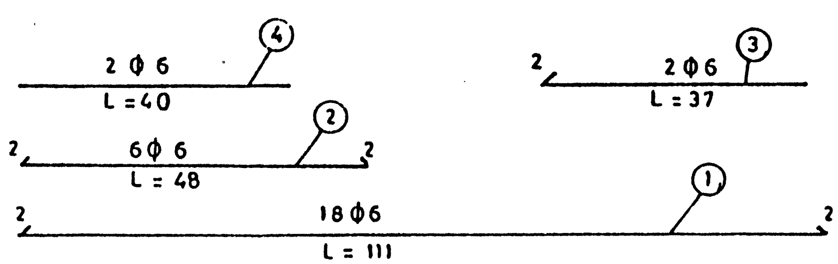
# Annex 3
# DACAAR
# Latrine Designs



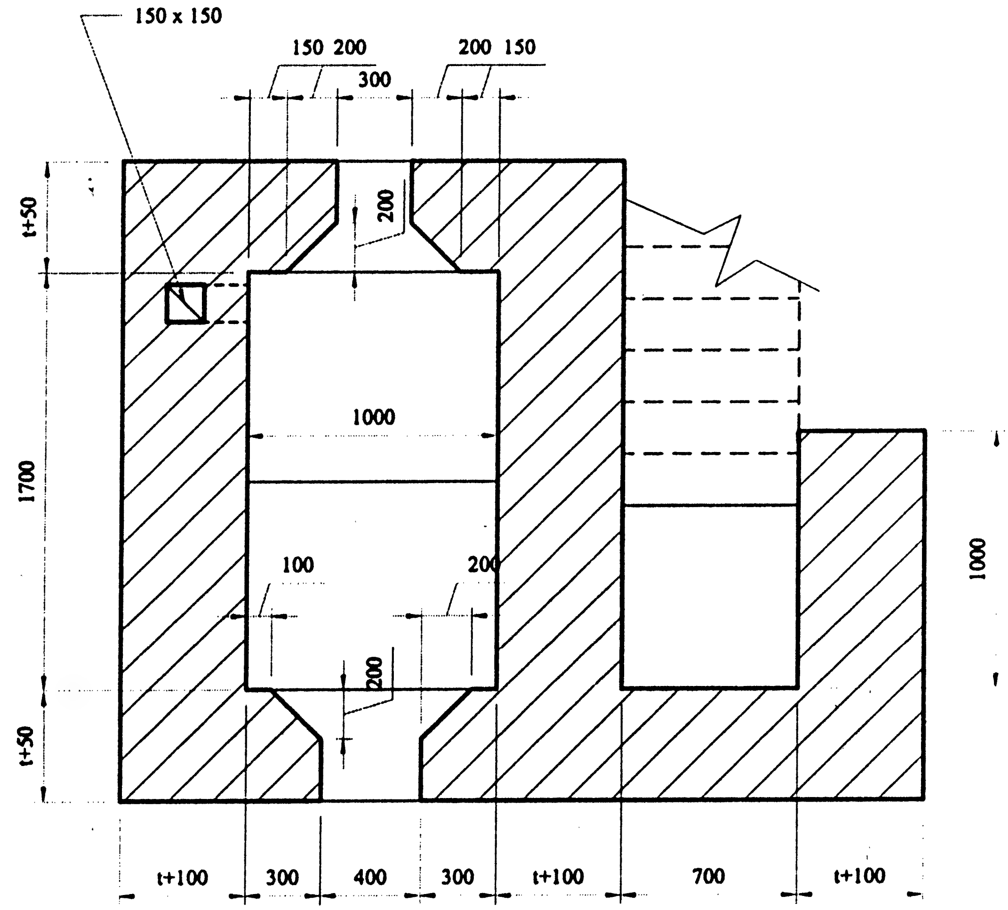

Annex (3-1-1) Floor Plan and Elevation



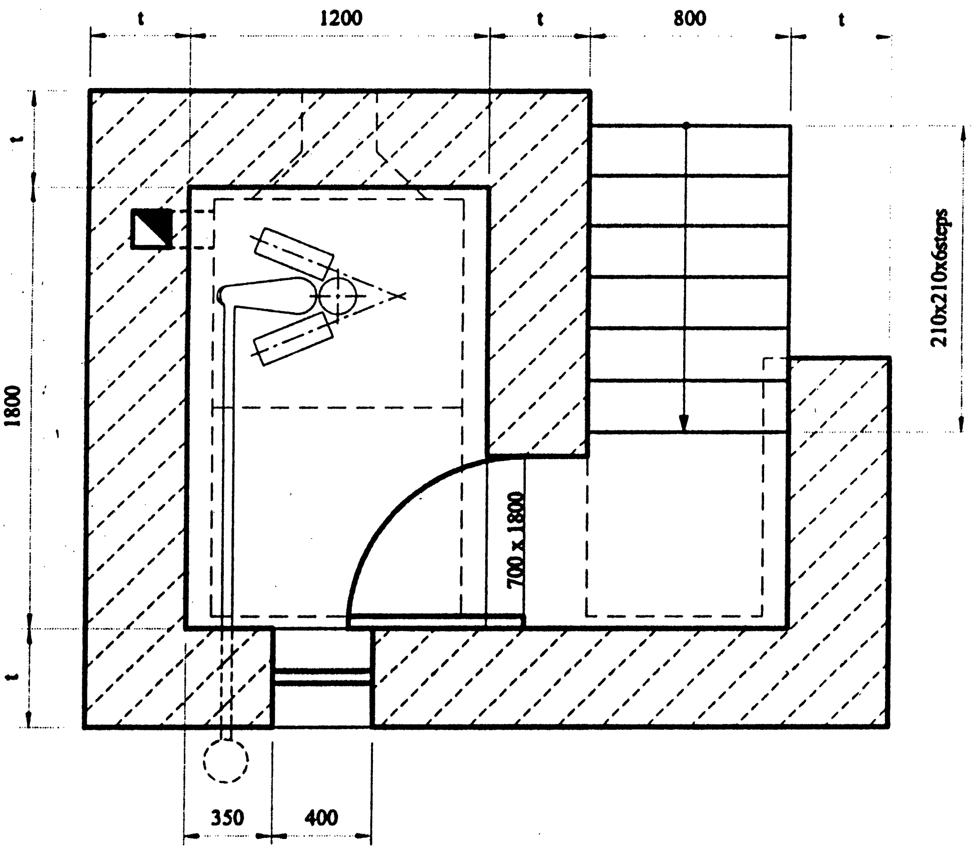




Annex (3-1-2) Latrine Slab Reinforcement



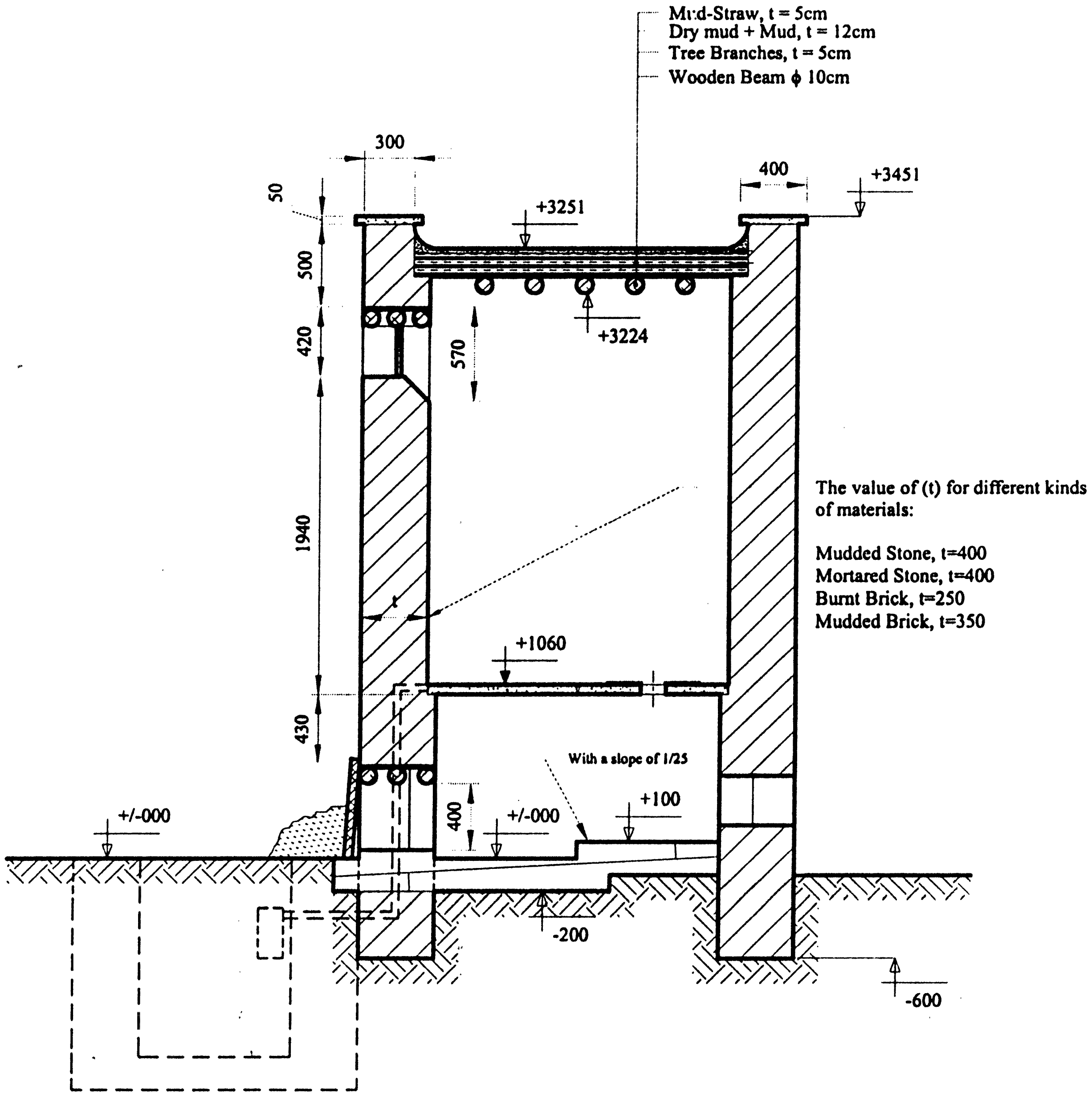

Annex (3-2-1) Foundation Plan

Scale = 1:30



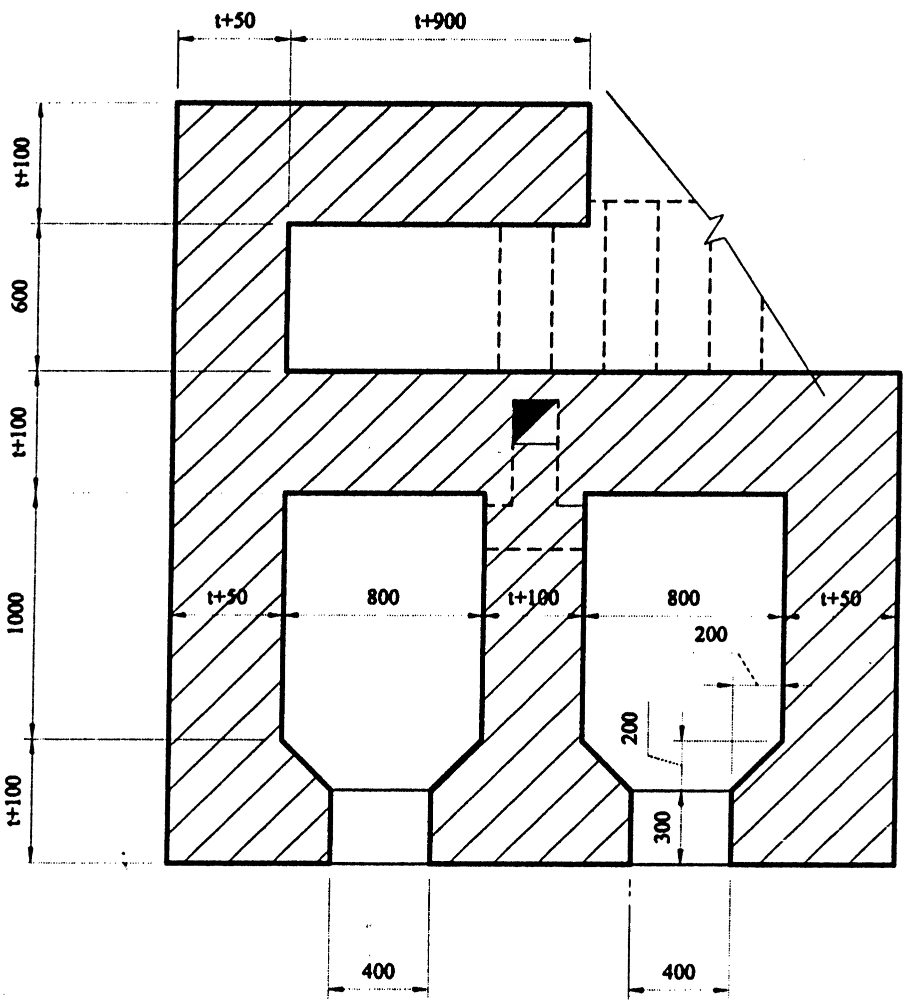

Annex (3-2-2) Floor Plan

Scale = 1:30



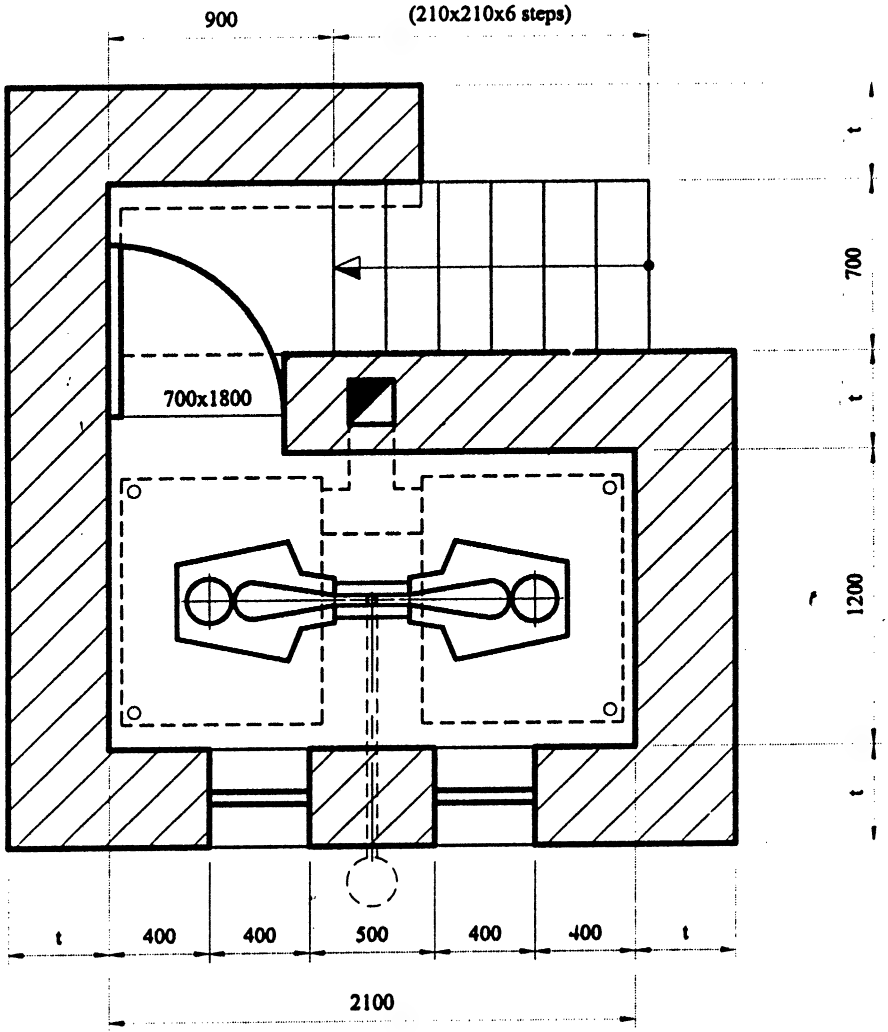

Annex (3-2-3) Vault Section/Wall Section

SCALE = 1:40



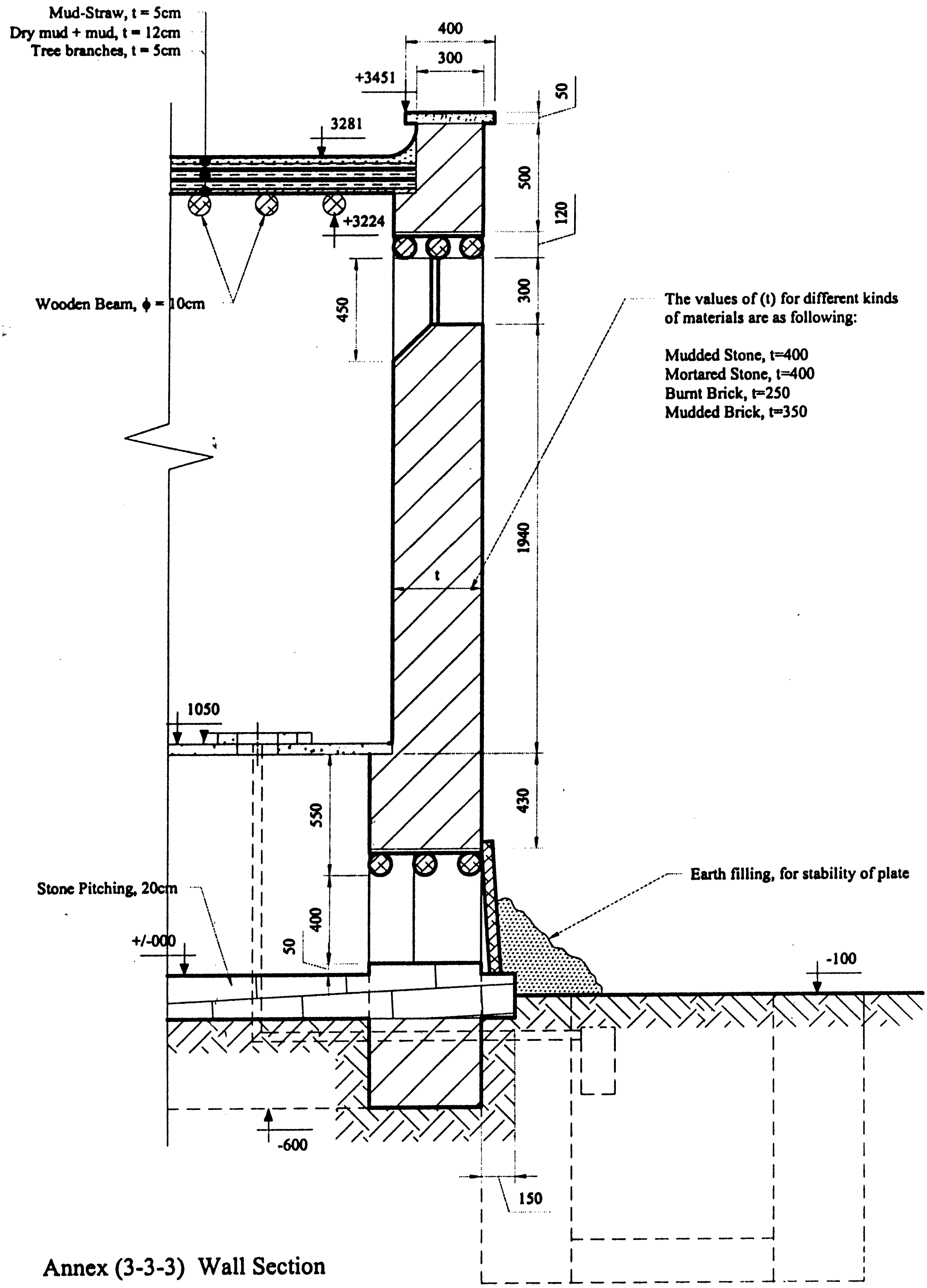

Annex ( 3-3-1) Foundation Plan

Scale = 1:30




Annex (3-3-2) Floor Plan

Scale = 1:30




Annex (3-3-3) Wall Section

SCALE = 1:25

- When removing the waste from the pit, the surroundings become contaminated and need cleaning.

Advantages according to the users:
- The house is clean.
- The children do not become sick.

Disadvantages according to the users:
- Removal of waste from the pit is difficult
- Construction cost is high, hence not affordable by average house owners.

*Implementation*
Around 50 units have been constructed.

## 2.2 Family VIP Latrine

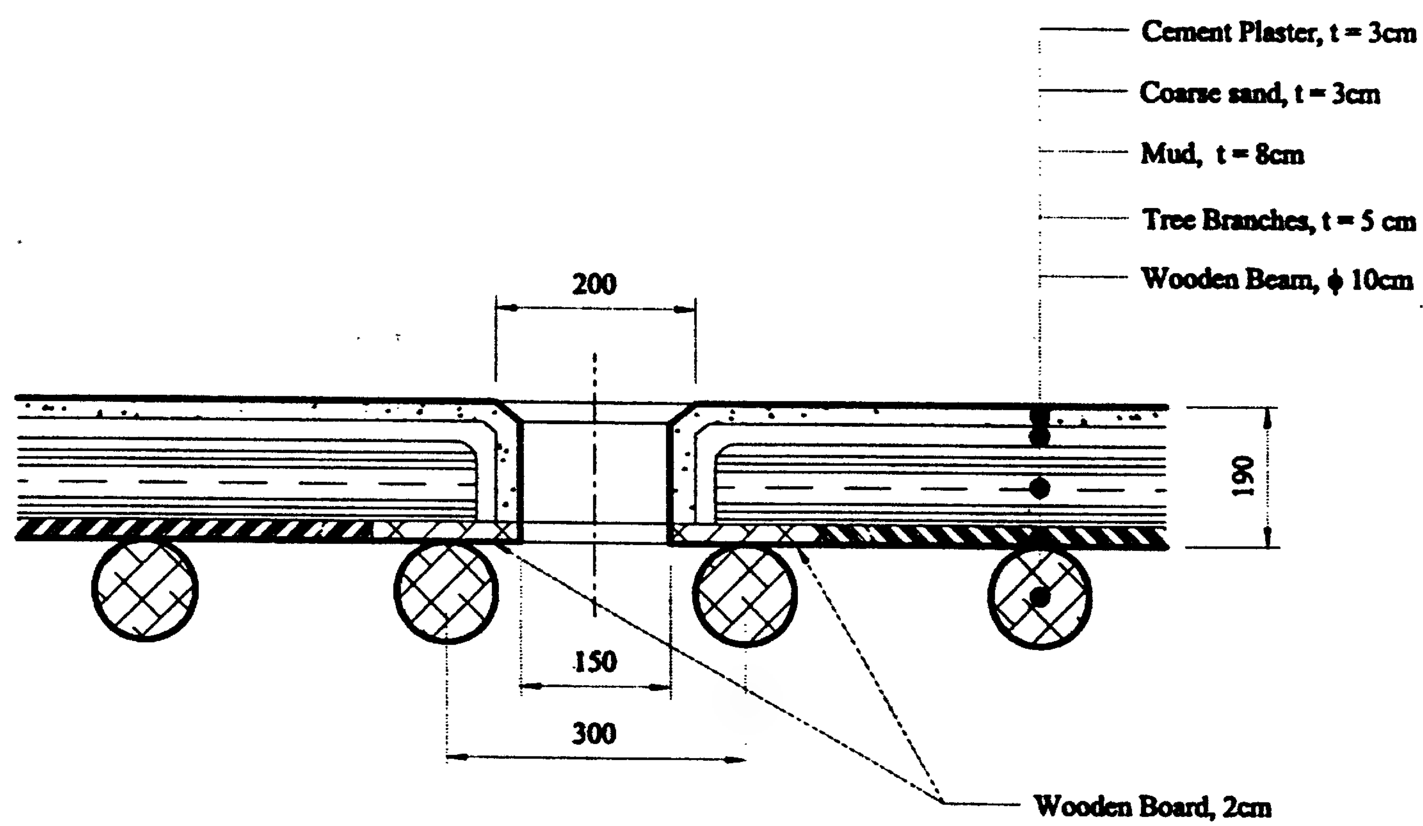
*Design (See Annex 1-2)*
- This design is suitable for areas where the groundwater is deeper than 6 m.
- In this case the bottom layer of the pit is porous and the wastewater can infiltrate into the ground as well as through the side walls.
- The vault is lower than ground level; the depth depending on the height of the ground water
- The waste removal is done by using an inverted shovel through the opening provided in one side of the pit.
- Ventilation is provided through a pipe
- To make it cheaper, the roof is wooden boards covered with mud.
- The cabin dimensions are: 150 cm by 120 cm making it quite spacious
- Urine is diverted to a soak pit

*Cost*
The cost of materials for this design is $86.

*Retention Time*
The volume of the vault is $3.6m^3$. It should be cleaned when excreta has reached a level 50 cm below the squatting plate. If we assume a family has 10 members, the retention time is six years.

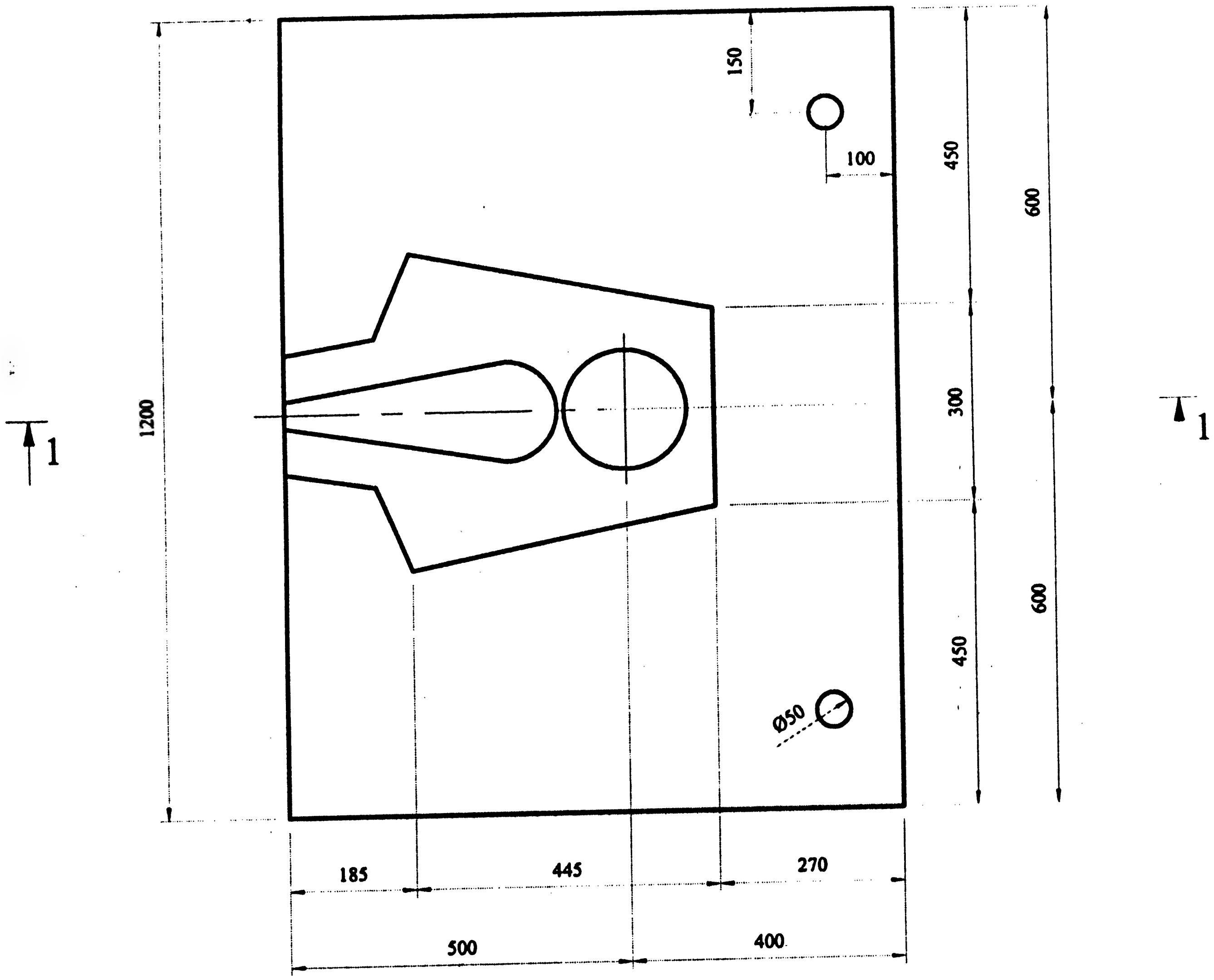
*Advantages and Disadvantages*
The disadvantages are:
- It is expensive.
- Cleaning of the vault is difficult and if it is not cleaned then it has a bad smell
- During the rainy season, if the water table is not deep enough, water can enter the vault.

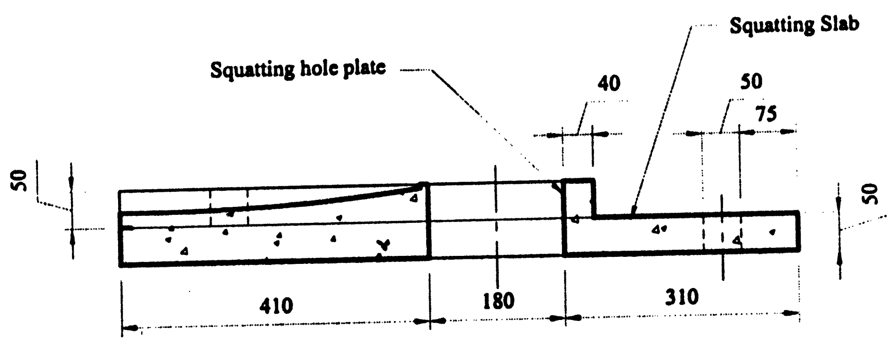
Advantages:
- Pit is large allowing an increased retention time leading to better dehydration and fewer pathogens in the excreta




Annex (3-3-4) Detail of Floor/Section of Squatting Slab for non RCC floor

SCALE = 1:10



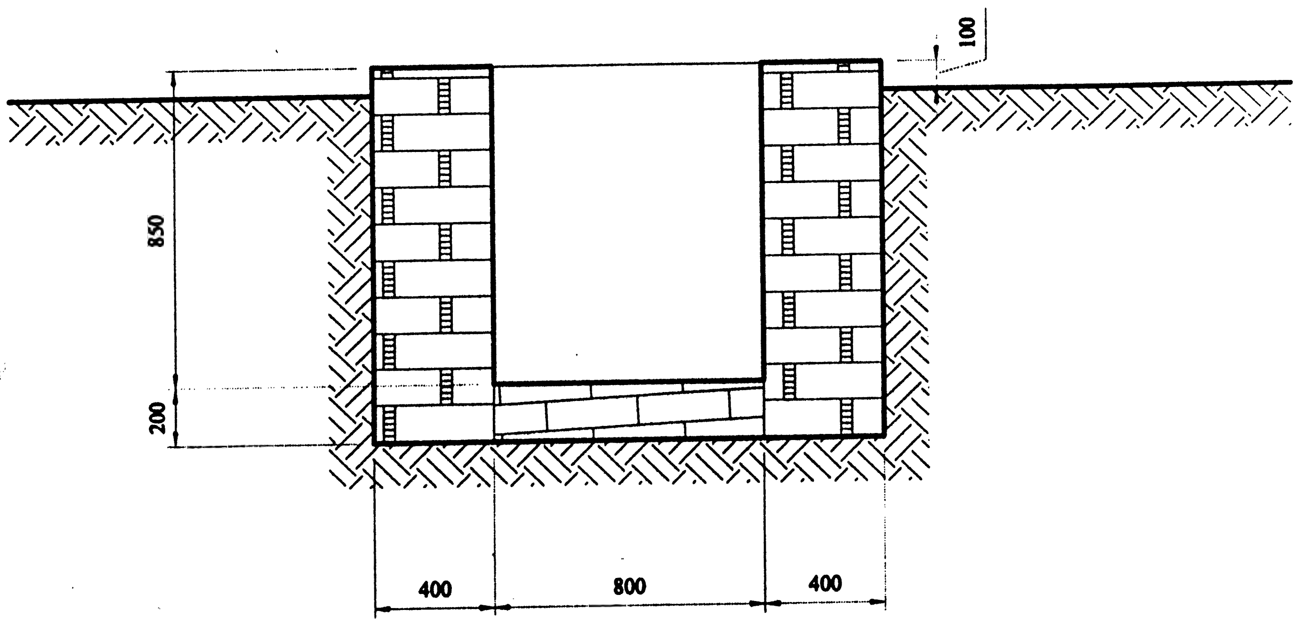




## Section 1-1

**Scale = 1:20**

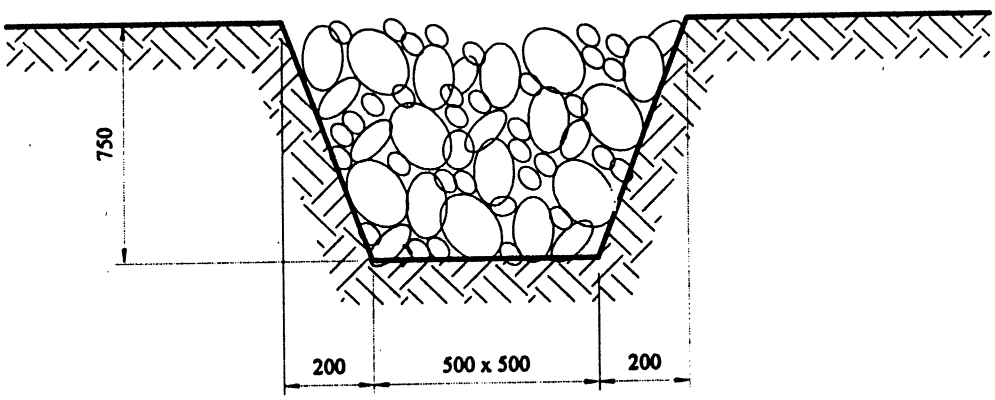


Annex (3-3-5) Squatting Slab




Annex (3-3-6-a)Urine soak pit ( Impermeable type )

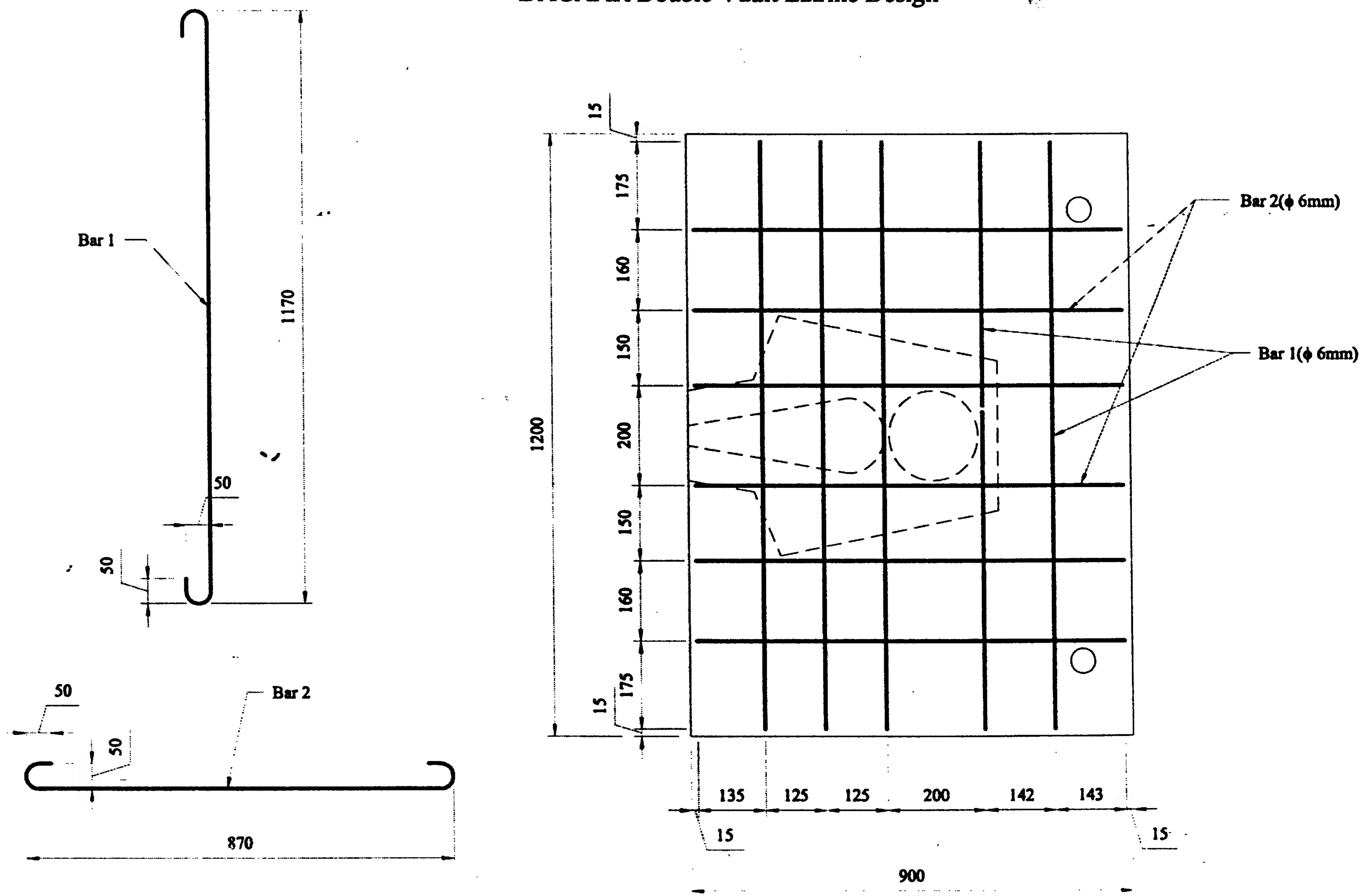
Scale = 1 : 25




Annex (3-3-6-b)Urine soak pit ( Permeable type )



Scale = 1 : 25

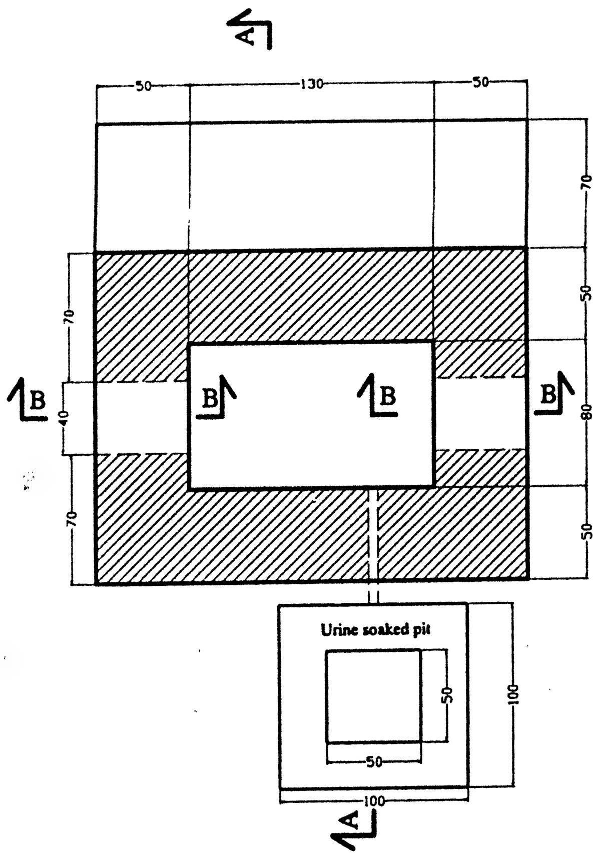



Annex (3-3-7) Reinforcement of Squatting Slab

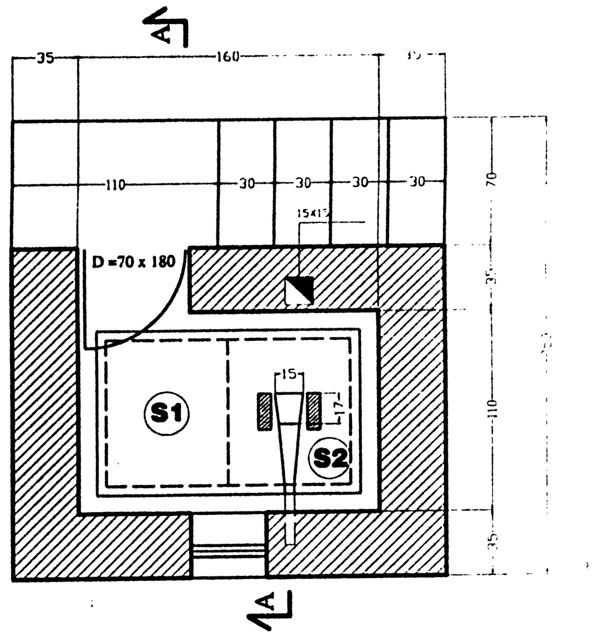
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# Annex 4
# SCA Latrine Designs

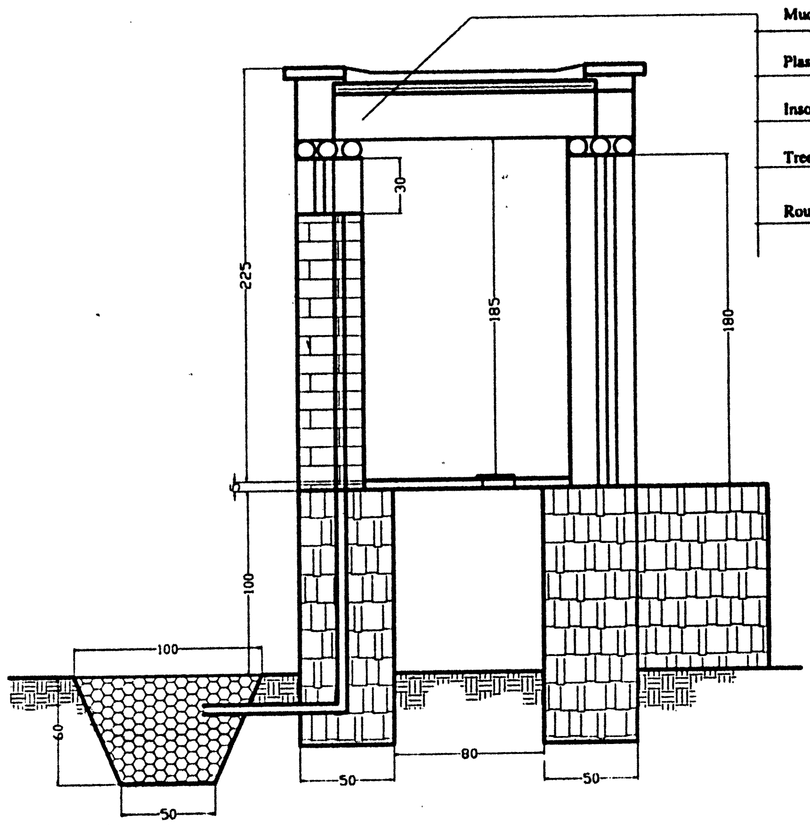
# SCA Single Pit Dry Vault Latrine Design



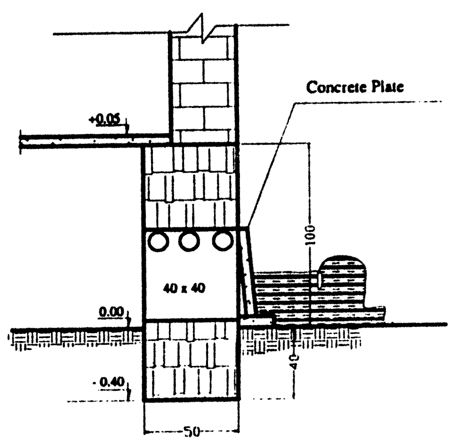

*Foundation Plan*




*Ground Floor plan*




*Section A-A*

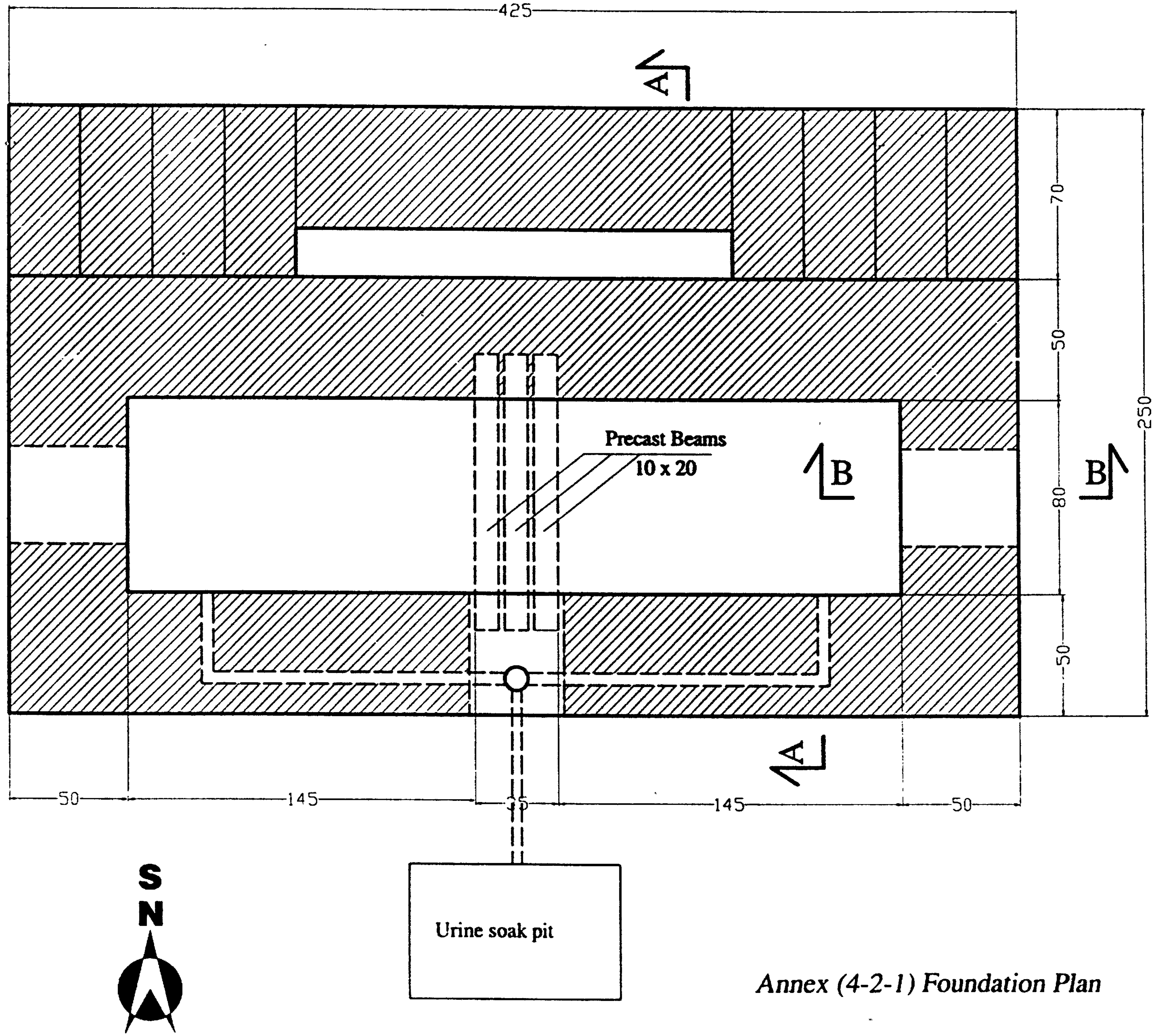



*Section B-B*



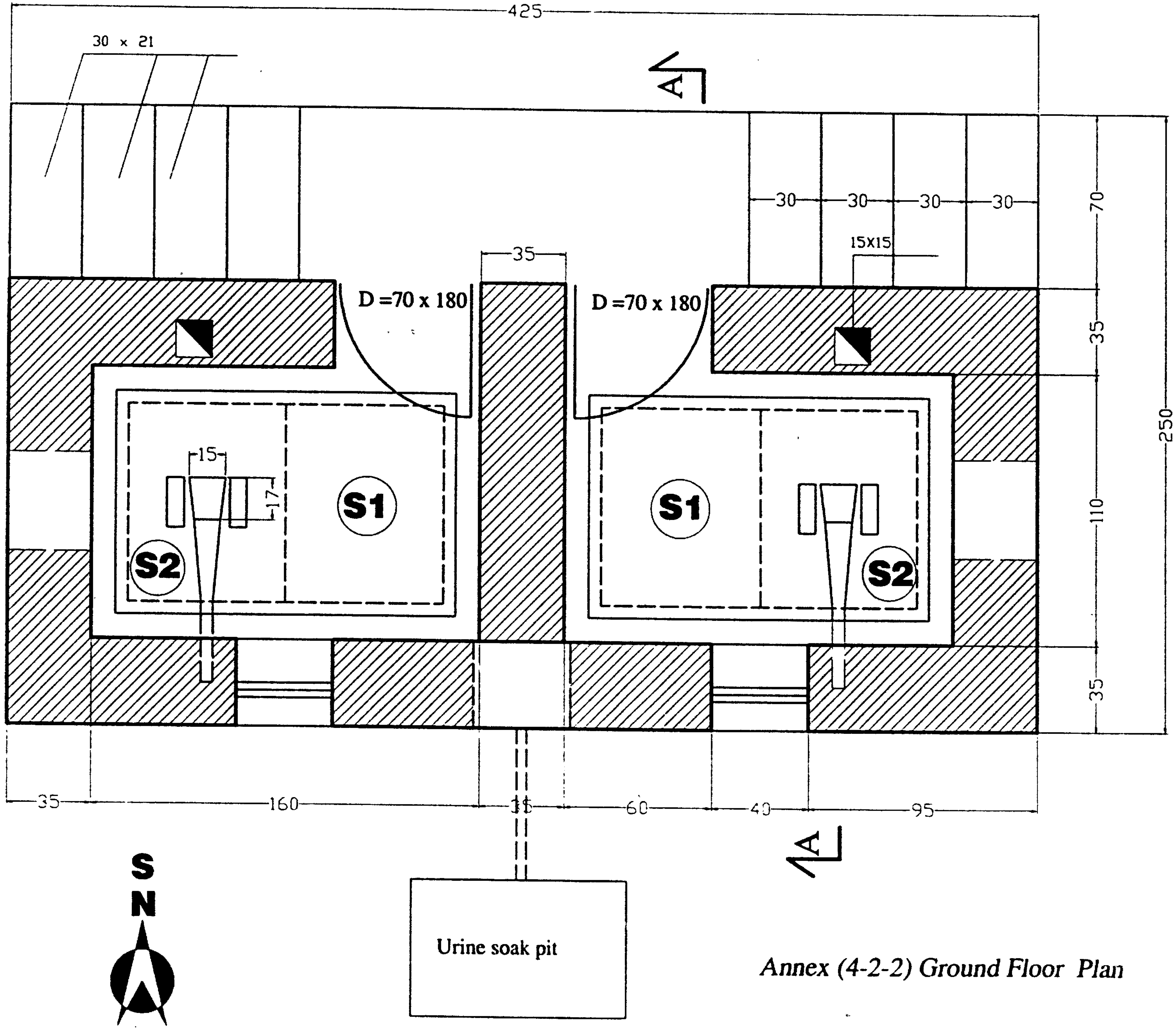
*Annex (4-1)*

## SCA Double Compartment Dry Vault Latrine Design



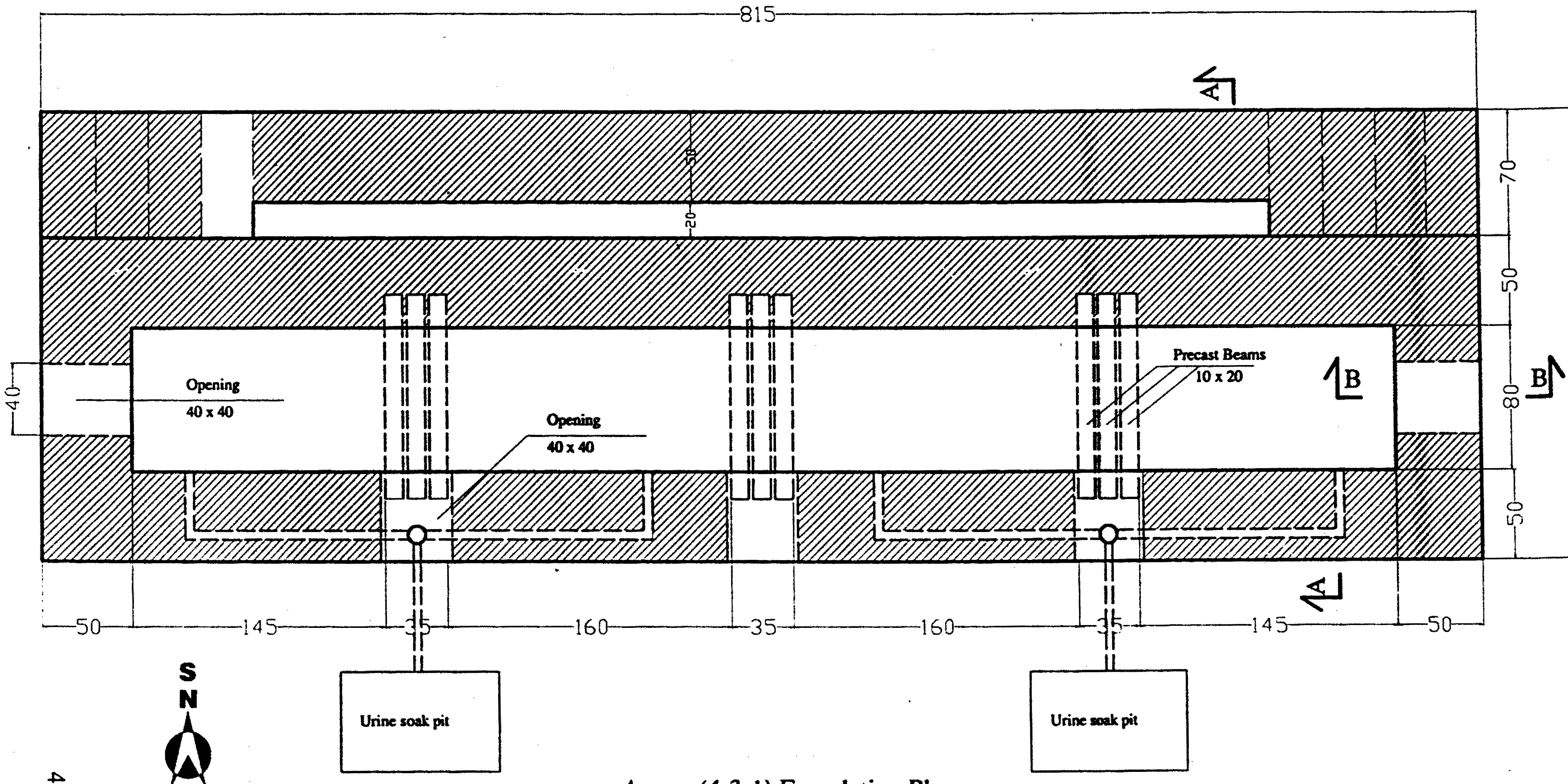

*Annex (4-2-1) Foundation Plan*

## SCA Double Compartment Dry Vault Latrine Design



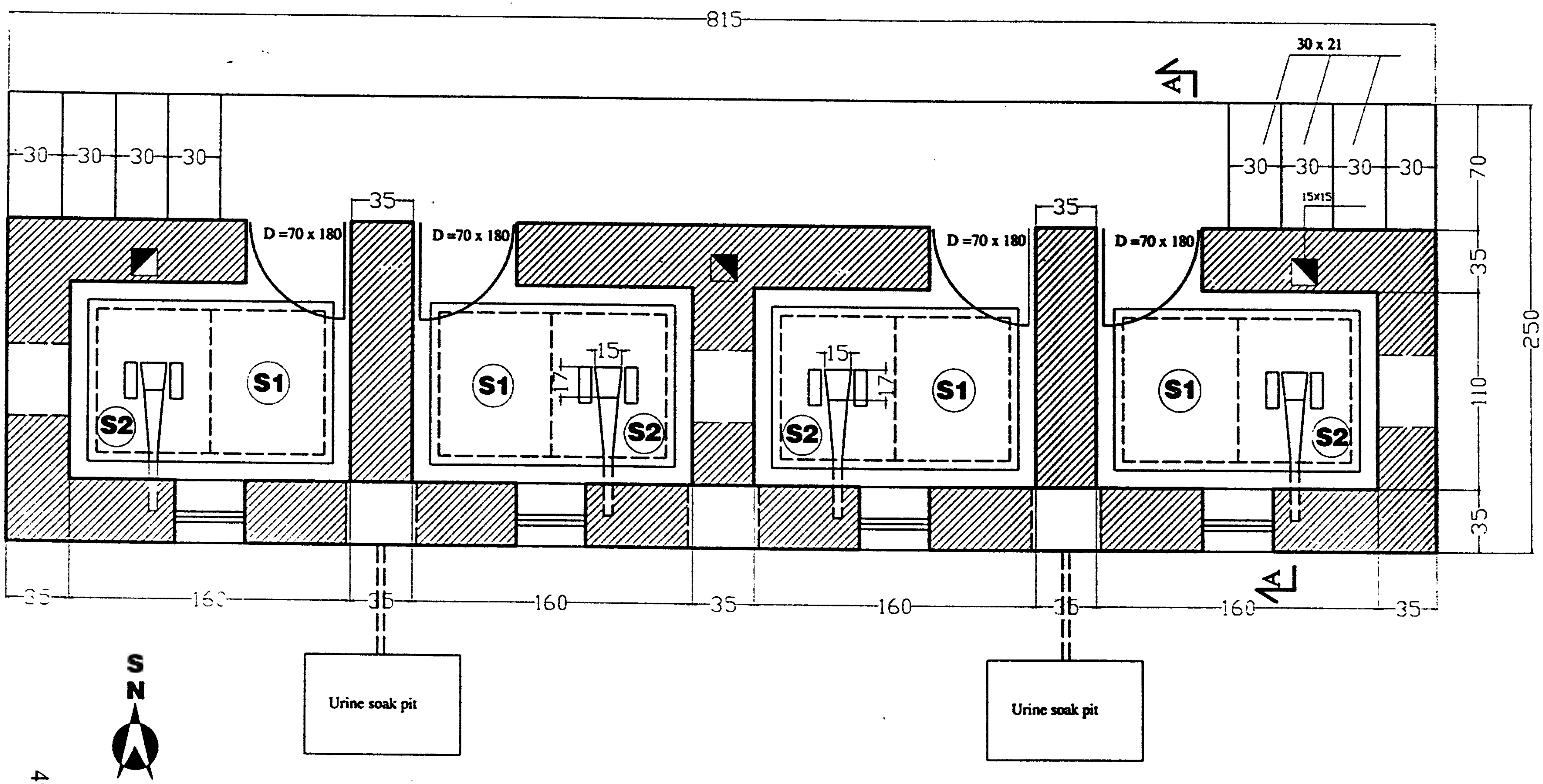

*Annex (4-2-2) Ground Floor Plan*

SCA Four Compartment Dry Vault Latrine Design




*Annex (4-3-1) Foundation Plan*

## SCA Four Compartment Dry Vault Latrine Design




*Annex (4-3-2) Ground Floor Plan*

*Implementation*
Around 150 latrines of this type have been constructed.

## 2.3 Family VIP Latrine (Liquid/Solid Separation Type)

This design is similar to the 'Family Latrine Design for Places with High Groundwater Table' except that in this design there is an opening in the pit/vault for the waste removal, and the pit/vault is partially below ground level. *(See Annex 1-3)*

The advantages and disadvantages are the same; the cost is $ 68.

Approximately 100 latrines have been implemented.

## 2.4 Double, Ventilated, Improved Pit Latrine

This is a double pit latrine with a single cabin that lies over both pits. The latrine is suitable for areas with deep groundwater because the pit is situated below ground level. However it can also be used in areas where the ground water is high provided that the pit is above or partially above ground.

As is usual, whilst one pit is in service, the other is closed and composting. When one pit is filled to 50 cm from the bottom of the squatting plate, it is covered with earth, straw, grass and so on and is taken out of service. The other one is then put into operation.

*Operating principles:*

- The pit is used until excreta reaches 50 cm height from the squatting plate.
- When the pit is filled, the concrete plate of the opening is removed and the waste is taken out of the pit using an inverted shovel.
- The waste is mixed with earth material and buried in the ground.

*Cost*
Cost of the materials for this kind of latrine is $196.

*Retention Time*
We assume that a 10 family member can use this latrine (the vault is 150 cm by 150 cm) for 5 years.

*Advantages and Disadvantages*
Advantage is:
- The double pit design ensures that full composting is possible and pathogens are mostly destroyed
- There is no smell

The disadvantages are:
- The latrine is costly
- The latrine requires substantial space in the courtyard.

## 2.5 Discussion from the Floor

In response to a question, WHO replied that WHO sanitation and water supply projects, include social mobilisation and health education; health educators and social mobilisers visit houses and mosques to discuss community contribution and describe the latrine designs.

In answer to another question, WHO replied that the double-pit latrine is the most popular design; however the cost is a constraint. WHO intends to test more designs/models until an appropriate design for Afghanistan is found.

# 3. Presentation of German Agro Action Latrine Designs

**By Robert Godin, GAA**

GAA's sanitation programme has been operating for four years in Afghanistan installing latrines in Kabul and Kandahar. GAA has three types of latrine design:

- Improved Traditional Afghan Vault latrine
- Double Pit Soakage system
- Sewered Interceptor Tank system

## 3.1 Implementation Strategy

GAA implements sanitation programmes in three stages; the first stage is community mobilisation which involves a motivational health visit. During this visit the benefits of having an improved latrine system are discussed with individual families. The second stage consists of a survey to decide what type of latrine, out of the three options, is possible in that particular area. Then there is the actual installation of the latrine and after the installation, a post-project health visit to find out if there are any problems with the installed latrine system and also to see whether the family have improved their hygiene habits.

## 3.2 Traditional Afghan Dry Vault Latrine

Before discussing the GAA improved traditional Afghan vault latrine we will consider what are the disadvantages of the traditional Afghan latrine as it is. The specific problems with this latrine are:

*Design (See Annex 2-1)*

- Normally the squatting plate is made of mud and is placed on wooden beams. This causes a cleaning problem.
- The squatting hole is not standardised and after a while the size tends to increase. If the squatting hole is too large then children are afraid to use it.
- The vault usually opens at street level and, since there is poor containment of the waste, contaminated material tends to flow onto the streets.
- There is generally no separation of the solid and the liquid human waste.
- There is insufficient cabin and vault ventilation

GAA considers the following criteria are necessary for selection of an appropriate latrine design:

- It should be socially acceptable
- It should involve a minimum requirement of water
- It should not contaminate the environment with regard to ground water and odours that are produced.
- It should be widely adaptable to different settings.
- It should require low maintenance
- It should be hygienic, which is the most important point.

## 3.3 Improved Traditional Afghan Vault Latrine

GAA has taken the traditional Afghan dry vault latrine and brought about the following improvements *(See Annex 2-2-1)*:

### 3.3.1 Vault Door

GAA has provided a steel vault door at street level. This vault door is higher than the street level so that rain and drain water cannot enter the vault. The vault door opens upward so that if somebody leaves it open, due to its weight, it will close automatically. The vault door has a rubber lining to increase the sealing effect.

### 3.3.2 Urine Separation

The separation of solid and liquid human waste, is made possible by the design of the concrete slab which has a channel where the liquid waste is directed to a soak pit through a PVC pipe. The benefits of urine separation are:

- The moisture level of the vault contents is reduced thus allowing dehydration
- The volume of the solid human waste is also reduced.
- Excavation of the solid human waste is safer because the waste has composted
- Reduces odour

### 3.3.3 Ventilation

Minimising of the odour, is made possible through provision of a ventilation pipe passage. This can be made from brick masonry or PVC pipe.

When this latrine was first designed people complained of the odour; one of the reasons for this was that people were not closing the vault door believing that if the door was closed it would increase odour. Education of the users was increased to cope with this problem and also the vault door design was changed.

### 3.3.4 Vault Design

There is a slight slope in the vault, which makes it easier to clean.

### 3.3.5 Concrete Squatting Plate

A concrete squatting plate is easier to keep clean; it also maintains condition and shape over time. It is portable if, for instance, the owner has to move house, he can remove it and take it out. It also facilitates liquid solid separation.

### 3.3.6 Cost

The construction cost for such a latrine is $ 62. The amount provided by the project is $ 47, while the owner contributes $ 15 (25% by the owner and 75% by the project).

## 3.4 Discussion from the Floor

In answer to a question from the floor GAA responded that there had been problems with keeping the vault doors closed; this was especially a problem with their previous design. People think that if they leave the vault door open it will reduce the smell. As a result GAA subsequently redesigned the ventilation pipe to maximise the removal of

air and provided a lock for the vault door. GAA suggests that the exhaust pipe should be of concrete not PVC to maximise the ventilation effect. If it is PVC it should be at least 4 inches in diameter, with masonry it can be increased further.

# 4. Presentation of DACAAR Latrine Designs

By Martin Krayer von Kraus, Technical University of Copenhagen

DACAAR recently decided that the currently used DACAAR latrine design was not sufficiently flexible for use in different situations nor sufficiently hygienic. As a result a survey was carried out of latrine designs being used by the various agencies working in Afghanistan with a view to selecting or developing a better latrine design.

## 4.1 Urine Diversion

DACAAR is interested in promoting urine separation and use of urine as fertiliser because, given the poor state of the economy in Afghanistan it is sensible to try and conserve the valuable nutrients in urine for use in agriculture.

The average person excretes the equivalent of 4 kg of urea fertiliser a year; for a family of 8 people that comes to 32 kgs of urea fertiliser a year which is the equivalent of 2/3 of a bag of fertiliser. Since the average Afghan family can only afford 2 to 3 bags of fertiliser per annum, an extra 2/3 bag of fertiliser is not negligible to them.

Taken on a larger scale an agency such as DACAAR implementing 6,000 latrines a year, if successful in promoting the use of urine as fertiliser, could have a significant impact on local agriculture. Assume a 50 % loss of nitrogen through evaporation, and assuming 6,000 new latrines installed every year, each used by 8 people, the total contribution of fertiliser would be the equivalent of an additional 96,000 kg of urea.

Looking at the cost effectiveness of such a strategy; assuming 6,000 latrines a year at about a cost of 1.5 times DACAAR's present latrine cost, the budget would be approximately Rs.5,256,000 a year. The value of the fertiliser derived from urine would be about Rs. 1,344,000 ($ 26,880) a year which means the return on investment is about 4 years. In other words, within 4 years such a sanitation programme will have paid for itself within the community. Because in DACAAR projects, community contribution is high at 67% it comes out at about seven years for return on investment.

## 4.2 DACAAR's Sanitation Implementation Strategy

The objective of the DACAAR sanitation programme is to improve the hygiene practices especially of women and children by introducing baths and latrines to individual families to serve as a demonstration model for the whole community. Thus only 5 to 10 % of households in a village are covered by the sanitation project which is expected to be sufficient to motivate the rest of the community to install latrines themselves.

DACAAR provides each family with: a latrine slab, manhole frame and vault door, ventilation pipe 4" PVC with meshing on the top, as well as advice on installing these components. As community contribution, the users provide all the unskilled labour, construct the superstructure of the latrine and share with DACAAR in transportation of concrete elements.

# Proceedings
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**Continental Guest House, Peshawar**

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